

Kleen Energy Systems Electric Generating Facility



Compensatory Wetland Mitigation Plan

Programmatic General Permit Program Category II Addendum Application

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1.0 PROJECT BACKGROUND

1.1 Introduction

The following proposed Compensatory Wetland Mitigation Plan ("April 2005") incorporates recent design changes proposed by Kleen Energy Systems (KES) and follows a meeting conducted on March 29, 2005 at the offices of the Connecticut Department of Environmental Protection (CT DEP). KES and PB Power engineers proposed at this meeting, at the Connecticut Siting Counsel's (CSC) behest, that the original substation design layout for the proposed facility be revised to accommodate a Gas Insulated System (GIS) Substation. The relocation of substation afforded the consolidation of a much smaller substation that would be located directly adjacent to the north side of the proposed turbine building. This facility building and substation configuration eliminated the need for a separate access road for the substation, it afforded a more "balanced" site civil design regarding the onsite steep slopes, cut and fill, and it facilitated the regrading of the facility roadway grade. The revised civil design and construction phasing plans have resulted in slightly less overall wetland fill and a simpler grading plan for providing compensatory wetland resource areas on the site.

The proposed revisions to the Compensatory Wetland Mitigation Plan primarily center on the minor relocation and grading plans for Area 3 (existing and proposed replacement wetland area). Some revisions also have been made based on comments received from the CT DEP on April 18, 2005, including the request to enlarge the Area 10 wetland enhancement area, since the facility road would be relocated slightly further to the north and the CT DEP was interested in the opportunity for additional compensatory wetland area. Table 2-1 in the following Section 2.0 of the Mitigation Plan tabulates the proposed effects on existing wetland areas on the site and the proposed compensatory mitigation for these areas. In summary, the proposed grading plans and mitigation plan revisions:

- did not change the need to fill isolated wetland in Area 5 and Area 8 as originally proposed;
- eliminated the need to fill Area 7 (wetland/watercourse) down-gradient stream designated as Area 9 (watercourse);
- slightly added the amount of fill in the Area 6 (quarry wetland);
- eliminated the need to completely excavate and construct Area 2 watercourse segment and Area 3 wetland; and
- eliminated the need to completely re-channel the Area 4 watercourse segment (i.e. a substation access road is no longer proposed).

The following Compensatory Wetland Mitigation Plan has been revised to accommodate revised site grading and storm water design plans, mitigation areas, and minor changes in hydrologic calculations. The fundamentals of the mitigation design of vernal pool and wetland habitat and the proposed "Reserve Area" of the plan remain intact.

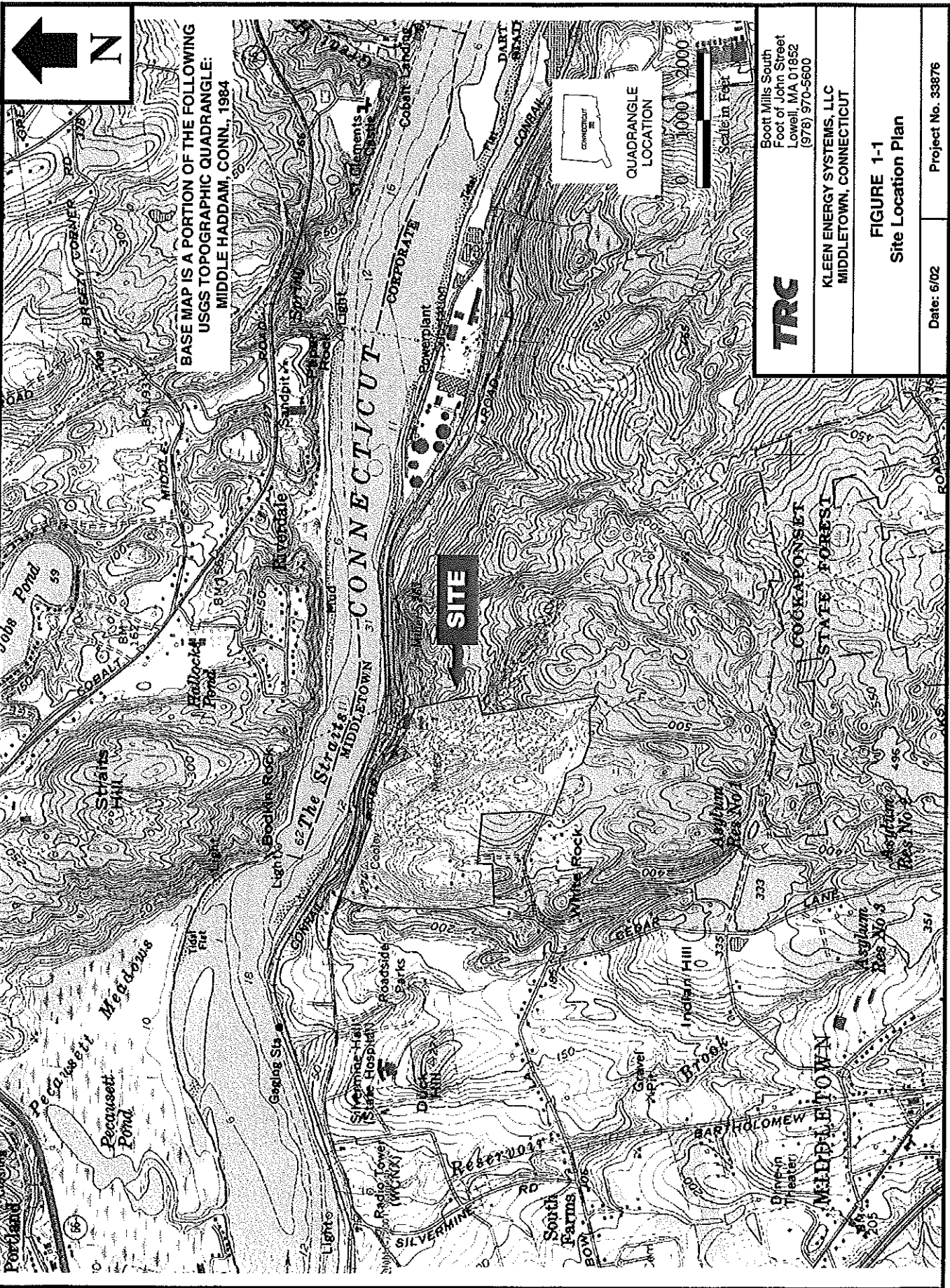
1.2 Project and Mitigation Plan Background

KES proposes to build a new 520 megawatt (MW, nominal capacity) combined cycle electric generating station in Middletown, Connecticut ("the Project"). KES controls a 137-acre parcel for the proposed energy facility development. The location of the project is depicted on a U.S.G.S. Quadrangle map designated as Figure 1-1. A comprehensive engineering and environmental alternatives analysis determined that the most environmentally suitable location of the proposed site development is on a 30-acre disturbed portion of the former feldspar mine site shown on Figure 1-2A Aerial Photograph (Latitude 41° 33' 13.54" N/Longitude 72° 35' 54.10 W). On this portion of the site, old quarries and detention basins were characterized and determined as having sufficient hydrology and a predominance of wetland vegetation to meet the regulatory definition of wetlands according to local, state, and federal regulations.

The Compensatory Wetland Mitigation Plan (herein "MP") has been prepared and submitted in accordance with Section 404 of the Clean Water Act under the Army Corps of Engineers ("ACOE") regulations and conditioned under the Connecticut Programmatic General Permit program ("PGP"), the PGP Screening review committee, and the Connecticut Inland Wetlands and Watercourse regulatory review process. This Plan has been organized and contains required details in conformance with the recent ACOE guidelines issued for wetland mitigation plans, i.e. "Guidance for Mitigation Plan Checklist" (June 2004). The proposed Mitigation Plan also incorporates the Connecticut Water Quality Certification review process. A conceptual Mitigation Plan was proposed in the PGP Addendum Application submitted by KES in September 2002 to mitigate the proposed fill of approximately 0.86 acres of regulated wetland. Direct fill and excavation activity has been reduced to 0.56 acres. Following consultation with the U.S. Fish and Wildlife Service and the Connecticut Department of Environmental Protection ("CT DEP"), we are presenting herein the details of the proposed MP for the Kleen Energy Electric Generation Project ("Project").

Most of the area where the Project access road and the development "footprint" will be located is on disturbed land that is underlain by rock and the remnants of extensive mining that lasted for more than 100 years. Portions of the parcel are barren, and other portions vegetated with opportunistic and disturbance tolerant herbaceous and woody species, or forested with 10-15 year old tree growth. The parcel is bounded on the north by River Road. North of River Road a rail line traverses east/west, and Connecticut River frontage lies to north of the railroad. To the east of the site is an extensive wooded parcel with numerous dirt roads and trails, and a 345 kV overhead transmission line right-of-way owned by the Connecticut Light & Power Company. To the west of the KES parcel are residential properties and old field owned by the State of Connecticut. The southern side of the site is bordered by Bow Lane, which is residentially zoned and has several residences.

As required for energy development projects, KES submitted an application for a Certificate of Environmental Compatibility and Public Need for an Electric Generating Facility and Switchyard to the Connecticut Siting Council ("CSC"). Kleen Energy Systems, LLC participated in public hearings with the Middletown Inland Wetlands and Watercourses Agency



Enhancement wetland plant species will consist of primarily aquatic and palustrine emergent species selected for their value as known species associated with wildlife habitat. In summary, KES proposes to create a total of approximately 17,103 sq. ft. wetlands, enhance 11,500 sq. ft. of existing Area 3, replace 6,454 sq. ft. to compensate for Area 5 vernal pool habitat, and restore approximately 180 linear feet of watercourse on the site.

In addition, the proposed "Reserve Area" will include compensatory mitigation to further improve existing wetland and terrestrial wildlife habitat conditions on the 137-acre property controlled by KES (see Figure 1-2A). Details concerning the management of the Reserve Area enhancement are as follows.

1.4 Proposed Reserve Area Management

The proposed Reserve Area within the boundaries of the 137-acre parcel owned by KES has fundamentally developed as part of the agency reviews and authorizations in the context of overall land use and resource planning. The value of the Reserve Area was also recognized with respect to enhancing the proposed wetland mitigation, and has therefore become a key component of the MP. KES proposed and has accepted as a stipulation in the Location Approval by the Town of Middletown and the Connecticut Siting Council Order for the Project to conserve and reserve approximately 51.3 acres located west of the proposed energy facility construction limits, including an approved three-lot subdivided parcels contained within the 137-acre parcel with frontage on Bow Lane (see Figure 1-2A).

The purpose of the Reserve Area is to provide additional "temporal" compensation to offset wetland area disturbance both during and following construction of the Project. It will enhance the overall potential for terrestrial and aquatic wildlife habitat around the project area through development restrictions. An appropriate deed restriction or conservation easement will be developed for the Reserve Area. Prior to executing and recording a deed restriction, the Army Corps of Engineers (ACOE) will be provided a copy for review. Any executed and recorded deed restriction will be sent to the ACOE within 180 days of recording. Such reserve of conservation easement or deed restriction shall expressly allow for the creation, restoration, remediation and monitoring activities required by the MP on the mitigation sites. It shall also prohibit all other filling, clearing and other disturbances on these mitigation sites except for jurisdictional activities explicitly authorized by the ACOE.

Mitigated impacts of the project are described in the following Section 2.0. Because the proposed Area 3 wetland mitigation area and vernal pool enhancement areas are located adjacent or within the proposed Reserve area, suitable wetland and vernal pool buffers will be provided and these buffers have restricted public access.

Existing wetland resources within the Reserve Area consist of Area 1A (approximately 0.4 acre), which is one of two deep quarries that have filled with ground water and surface water that eventually flows through the central drainage on the 137 acre parcel (designated as Areas 2 and Area 4 of the site). Also identified on the site are two forested scrub/shrub wetlands located in the south eastern corner and south central area of the Reserve Area. These area comprise areas approximately 0.08 and 0.64 acres respectively. The remainder of the Reserve Area consists of

terrestrial habitat comprised of approximately 48.98 acres of forest and shrub species characteristic of pioneer succession after various stages of clearing and disturbance during many years of mining activity.

2.0 PROJECT IMPACTS AND COMPENSATORY MITIGATION AREA

2.1 Existing Resources and Project Impact

As previously noted, Figure 1-2 of the Mitigation Plan illustrates the existing wetland and watercourse resources on the entire 137-acre KES site development vicinity. Figure 1-3 illustrates an overlay of the proposed KES Energy Facility development plan and wetland and watercourse mitigation areas. Table 2-1 summarizes the existing wetland and watercourses, their function and value, and the proposed impact areas resulting from the Facility development.

Of the 137-acre parcel controlled by KES, there is approximately 30 acres of land that remains actively disturbed (including unauthorized vehicle access) following the most recent mining activity that lasted for approximately 100 years. The remaining areas located on the western half of the parcel, while also disturbed by past mining activities, are subject to less unauthorized activity, have more diverse and mature vegetation, and generally have evolved as contiguous and improved wildlife habitat utilized by opportunistic species.

Specifically, the proposed Project "footprint" is located on the most recently disturbed 30 acres on the site. This area consists of previously blasted rock, or mine tailing fill areas over ledge, or directly on ledge. The surface terrain consists of obvious remnants of extensive mining; rock and soil borrow piles, excavated quarries and ledges, mine tailing piles, and a network of construction roads and drainage ditches; some ditches still convey runoff, some do not. All the wetlands subject to proposed fill or alteration on the KES development site have been artificially created during these mining activities. All the wetland and watercourse areas identified have soil/substrates consisting of bedrock, blasted stone, and mine tailings, with very little organic soil development. Evidence of original topsoil on the entire parcel is minimal. Portions of the footprint area are completely devoid of vegetation, while other areas are overgrown with secondary "opportunistic" vegetation or planted "conservation" species such as Vetch, or they are forested with saplings ranging from a few years to approximately fifteen years in age.

As characterized in the wetland resource report in Attachment A, the wetlands developed in Area 3, Area 5, Area 6, Area 7, and Area 8 as a result of altered drainage and the persistence of saturated conditions. These wetlands primarily function as areas that attenuate storm flows, trap sediment from surrounding upland, reduce the impact of potential excess nutrient loading. Secondarily, these areas, after a period of inactivity, provide some cover habitat for some aquatic wildlife (primarily observed in Area 5).

2.2 Site Alternatives and Mitigation Site Selection Rationale

The selected location of the proposed KES Energy Facility conserves the less disturbed areas of the site and the more suitable wildlife habitat areas. Furthermore, the choice of using the most disturbed area on the parcel is consistent with recommendations received from the local Inland Wetlands and Watercourse Commission and representatives of the environmental community. Indeed, the Project represents a unique opportunity to reclaim an abandoned mine site that has very few alternative uses, and which poses a continual erosion hazard. KES's site alternatives

Table 2-1
Existing Wetland and Watercourse Resources
Proposed Impacts and Mitigation Summary

| Existing Type of Resource | Existing Size of Resource (square feet = sq. ft. linear feet = ln. ft.) | Regulated Area | Primary Function(s)/Value (low, med., high) | Project Impact Area | Proposed Mitigation/Goal |
|--|--|----------------------------------|---|---|---|
| Deep quarry - man-made | 1.25 acres and 0.38 acres (54,695 sq. ft. and 16,703 sq. ft.) | Area 1 and Area 1A - Watercourse | Water, nutrient retention; wildlife/ medium | 0 See proposed Vernal Pool Enhancement Area 1A | No impacts to Area 1A; Propose to create 5,395 sq. ft. of Vernal Pool habitat adjacent to Area 1A to compensate for Area 5 habitat loss. |
| Intermittent watercourse - altered | 784 ln. ft. | Area 2 - Watercourse | Site surface drainage and conveyance; wildlife/ med.; low | 0 No fill. | Add flow channel to accommodate proposed vernal pool. |
| Emergent wetland with scrub/shrub fringes & intermittent and braided watercourse formed in excavated depression filled with mine tailings. | 0.36 acres (15,950 sq. ft. <i>Phragmites</i> area & 21,245 sq. ft. total area | Area 3 - Watercourse/ Wetland | Water detention, flow attenuation, and sediment trap; medium; low | Fill ~ 1,262 sq. ft. See proposed Wetland Replacement and enhancement | Excavate deep tailings soil areas (11,500 sq. ft.) and restore with soil amendment and marsh wetland habitat; and, create an additional 17,103 sq. ft. of wetland. The wetland replacement of Area 3 includes wetland compensation for fill in Areas 3, 5, 6 and 8. Create 1,060 sq. ft. vernal pool habitat south of Area 3 to compensate for Area 5 fill. |
| Perennial watercourse with sapling cover. | 605 ln. ft. | Area 4 - Watercourse | Site drainage and flow attenuation and conveyance; sediment trap; wildlife use/ med.; low | Fill 360 ln. ft. | Restore 240 ln. ft. channel with existing stone, and small plunge pools from S.A #7 to Area 4 (watercourse). |
| Emergent isolated wetland created invertebrantly (excavated). | 0.18 acre (5,761 sq. ft.) | Area 5 - Wetland | Sediment trap/high; low | Fill 0.18 acre (5,761 sq. ft.) | Recreate 5,761 sq. ft. of emergent wetland (as vernal pool habitat) in larger wetland system (Area 3 and adjacent to Area 1A) to improve water quality and wildlife use. |
| Emergent wetland with scrub/shrub fringe and watercourse inlet and outlet formed in deep quarry. | 0.43 acre (8,477 sq. ft. <i>Phragmites</i> area & 16,800 total quarry bottom wetland area) | Area 6 - Watercourse/ Wetland | Drainage attenuation and conveyance, sediment trap, and wildlife use/med.; med.; low | Fill 0.13 acre (5,800 sq. ft.) | Recreate compensatory 5,800 sq. ft. in Area 3 and improve water quality and wildlife use. |

Table 2-1
Existing Wetland and Watercourse Resources
Proposed Impacts and Mitigation Summary

| Existing Type of Resource | Existing Size of Resource (square feet = sq. ft. linear feet = ln.f.) | Regulated Area | Primary Function(s)/Value (low, med., high) | Project Impact Area | Proposed Mitigation/Goal |
|--|--|----------------------------------|---|---|--|
| Watercourse with Emergent wetland with sapling fringe formed in excavated depression and braided sediment deposit. | 80 l.f. watercourse 0.12 acre bordering wetland (5,279 sq. ft.) | Area 7 - Watercourse/ Wetland | Drainage attenuation and conveyance; sediment trap; wildlife use/medium; low. | No fill. | Leave as watercourse/wetland habitat. |
| Emergent wetland with shrub fringe isolated wetland formed in quarry | 0.16 acre (7,363 sq. ft. <i>Phragmites</i> & 11,785 total quarry bottom wetland) | Area 8 - Wetland | Drainage detention and sediment trap; wildlife/low; low. | Fill 0.27 acres (11,785 sq. ft.) | Recreate 7,363 existing quarry wetland as marsh wetland in Area 3 wetland; improve secondary water quality function. |
| Watercourse formed from excavated ledge adaccess roads. | 190 l.f. watercourse 140 l.f. culvert | Area 9 - Watercourse/ Wetland | Drainage attenuation and conveyance; sediment trap/low | No Fill | Create ~ 180 ln. ft. of watercourse/plunge pool to stilling basin south of River Rd. |
| Emergent Scrub-shrub wetland formed from excavation for quarry and sediment pond | 0.10 acre 3,235 <i>Phragmites</i> area & 4,439 total wetland | Area 10 - Wetland | Drainage detention and sediment trap; wildlife/low; low | See proposed wetland enhancement | Propose wetland enhancement of Area 10, 7,712 sq. ft. Remove invasive species <i>Phragmites</i> and mine tailing/soil and replace with organic soil and wetland marsh species and add buffer zone. |
| Total Wetland Acres (emergent) Total Watercourse (watercourse length) | 2.9 acres 126,507 sq. ft. 1,659 ln.ft. | --- | --- | 0.56 acre 24,608 sq. ft. wetland (fill) plus 11,500 sq. ft. (excavation for enhancement wetland 360 ln. ft. Watercourse | Wetland replacement (Area 3) = 17,103 sq. ft. Wetland Enhancement (Area 3) = 11,500 sq. ft. Vernal Pool habitat (Area 1A & 3) = 6,455 sq. ft. Wetland Enhancement Area 10 = 7,712 sq. ft. Total Wetland Mitigation or 0.98 acres. Total Watercourse Restoration 240 ln.ft.; and, 51.3 acre Reserve Area for Compensatory Temporal Mitigation (see Section 1.2). |

analysis contends that any project that would propose to use this former mine site would be faced with the same substantial civil works and storm water runoff control challenges, and would quickly conclude that other less disturbed land areas on the parcel that did not require this effort was a better alternative. However, only a project with a substantial capital investment, like the proposed KES project, could support the investment needed to reclaim the abandoned mine site, provide temporal compensation with a Reserve Area, improve wildlife habitat, and control unauthorized off-road vehicle access in undeveloped areas of the parcel.

In addition to a thorough alternative analysis for siting the proposed Facility, TRC evaluated the entire 137-acre parcel for locating suitable areas for compensatory wetland mitigation. Evaluation criteria were based on mitigation goals, including:

- replace and improve with enhancement the existing wetland resources as compensation for the proposed excavation/fill of approximately 0.56 acres of the wetland and vernal pool habitat (Area 5) identified and characterized on the site;
- compensate for wetland functions lost due to the construction of the proposed facility, facility access roads, and the storm water management system;
- improve the water quality of onsite wetland areas through storm management and the runoff quality discharging the site to the Connecticut River;
- increase the wildlife habitat potential on the site by removing, controlling, and reducing dominant nuisance plant species (primarily *Phragmites*) and introducing additional native wetland plant species that will increase species richness (i.e. species structure and diversity);
- conserve "vernal pool" breeding species and enhance vernal pool habitat; and
- conserve existing wetland and upland habitat with a 51.3-acre "Reserve Area."

Since the facility siting alternative analysis resulted in confining the proposed development to the most disturbed portion of the site, the mitigation site alternatives evaluation process prioritized the western edge of the proposed development area where wetland impacts are primarily proposed, and where there is the most suitable hydrology. However, TRC also evaluated the feasibility of mitigating wetlands on the remaining less disturbed portions of the site (see Figure 1-3). These areas include:

- to the south of the development area around the Area 1 and 1A quarry ponds;
- adjacent to an existing isolated wetland located to the southwest of Area 1 and 1A;
- adjacent to an existing isolated wetland located to approximately 800 northwest of Area 1A; and
- adjacent to Area 10 (quarry wetland).

Potential compensatory wetland mitigation sites were evaluated on the following site selection criteria:

- locate compensatory wetland areas in the same sub-watershed drainage area as the wetland impact area;
- has adequate hydrology (volume and flow regime, hydro period, inlet and outlet characteristics and water source type e.g. surface water, groundwater, seep, etc.) that will support the persistence of saturated soil conditions for wetland hydrology (hydric soils);
- locate in a area that already supports emergent wetland vegetation;
- suitable conditions for replicating existing functions of impacted wetlands; and
- soil conditions and construction feasibility (depth to bedrock, mineral soil horizons, organic matter content, access to mitigation site(s)).

In addition to these siting criteria, a principal factor in the selection mitigation sites was the specific request made by representatives of the City of Middletown Conservation and Engineering Departments in their Orders for "Site Location Approval" to develop a comprehensive storm water management system and re-create and improve the wetland quality on and discharging the site. Because the ongoing disturbed site and the wetland areas (particularly Area 3, Area 6 and Area 7) are major sources of sediment during storm events, both departments recognized the necessity to reconstruct these wetland areas to control sediment loading off the site. Indeed, soil test pits in these areas indicate that mine tailings have deposited in Area 3, the central stream designated as Area 4, Area 5 (the isolated detention basin wetland), Area 6 quarry wetland, and Area 7. Area 3 receives overflow from the Area 1 quarry and the sub-drainage areas primarily covered with mine tailings directly to the east (see watershed plan C5 and C6 in Attachment B).

TRC evaluated the suitability, alternatives, and feasibility of wetland mitigation sites on the entire 137-acre site. In addition to the development site alternate sites were evaluated on western side of the site were determined unsuitable or limited for the following reasons.

- *Area 1 and 1A Quarry Pond Areas:* Area 1 and Area 1A are unsuitable for wetland mitigation because they a deep and steep sided quarries with only one surface outlet to a steeply graded and rock lined intermittent stream we designated as Area 2. Soil and topography are unsuitable.
- *West of Area 1A:* Previous site walkovers suggest that this area is relatively level and a potential surface water source may be available (Area 1A Quarry), however, depth to bedrock is within 2 feet of the surface and would be problematic for establishing a sufficient wetland hydrologic regime.
- *Northwest of Area 1A:* Although intermittent drainage forms in a low topographic area in this location, bedrock is likely near the surface. Additionally, this area is isolated from existing site access roads and would require the construction of new access and clearing to create a mitigation site. This area was determined suitable for a compensatory vernal

pool area because of water source, topographic position, and proximity to the Reserve Area (see Section 6.3).

- *Area adjacent to Area 10 Wetland:* Area 10 is a quarry surrounded on three sides by steep bedrock, however, soil and hydrology may be suitable for the expansion of wetlands to the north.

2.2.1 Preferred Mitigation Sites

TRC evaluated the suitability, alternatives, and feasibility of wetland mitigation sites on the entire 137-acre site and found that the proposed compensatory wetland mitigation is the most compatible in terms the proposed mitigation goals, and the most practical to construct with respect to site selection criteria enumerated above. KES proposes that Area 3 be the primary area to restore and expand the wetland areas affected by the project. As indicated above, the function and premise for locating Area 3 in its proposed location is based on three site factors: the project will not affect the hydrology up-gradient of this area and it has the necessary topography, wetland hydrology (landscape position, water source, volume and hydro period) to construct additional wetland north of Area 3.

In addition, as discussed with the CT DEP and the ACOE, Area 3 is currently dominated by the invasive species *Phragmites* and is a candidate site for wetland enhancement. With DEP concurrence, KES proposes to remove the existing mine tailings from the center of Area 3, thereby reducing the erosion and sedimentation of mine tailings currently deposited in downstream areas. Once the tailings are removed, the area will be regraded and planted with native wetland species to diversify the existing wetland vegetation. Furthermore, Area 3 located in a landscape position that will provide ecological or habitat sustainability without creating more disturbances to access the mitigation sites for construction. Area 3 generally has the greatest potential for long-term viability for improved wetland habitat on the site.

2.2.2 Summary of Wetland Function Improvements

The primary wetland functional attributes to be mitigated for Area 3, Area 5, Area 6 and Area 8 fill include storm flow attenuation and detention, sediment trapping, and water quality transformation. Wetland Area 5 is considered to have vernal pool value and compensatory vernal pool habitat is proposed to mitigate the wildlife function of this area.

In addition to meeting the general wetland restoration and replacement goals of the mitigation plan (see mitigation goals above), KES proposes the following wetland and water quality improvements.

- Improve existing vernal pool habitat characteristics, locate vernal pool habitat outside the development area, and place existing vernal pool habitat into a "Reserve Area" for conservation (i.e. ensure vernal pool buffer habitat);
- Conserve "vernal pool" breeding species;

- Remove existing sources (mine tailings) from existing wetlands to improve the water quality of runoff discharging to downstream areas of the site and the Connecticut, and wildlife habitat; and
- Increase the wildlife habitat potential on the site by removing, controlling, and reducing dominant invasive plant species (primarily *Phragmites*) and introducing additional native wetland plant species that will increase species richness (i.e. species structure and diversity).

The proposed re-grading and reconfiguring the site will allow for the creation of storm water management system that improves water quality before discharge to the central wetland/watercourse drainage complex on the site. The reclamation of the abandoned mine site affords the particular opportunity to stabilize the existing site so that it is not a source of continuous environmental damage, especially erosion and sedimentation that discharges to the Connecticut River. Based on this mitigation siting rationale, the proposed wetland mitigation sites and plan are consistent with state and federal mitigation plan standards and state water quality standards and criteria.

KES's commitment to reclaim the abandoned mine site affords the particular opportunity to stabilize the existing site so that it is not a source of other environmental damage, especially erosion and sedimentation. This commitment will significantly reduce the risk of sediment discharges to the Connecticut River. Reconfiguring the site and site access will facilitate the creation of a comprehensive mitigation and storm water management plan that will control the quality of site runoff, conserve contiguous open space, restrict unauthorized off-road vehicle use, and will improve wetland and aquatic habitat. Other factors involved in selecting the disturbed portion of the parcel include:

- Maximizing the distance between the Project from residential areas to minimize the potential for noise effects from the Project;
- The terrain will aid in obstructing the view of Project building components from the south, east and west;
- The existing deciduous tree line also creates a vegetative barrier around the Project site to the north, south, east and west;
- The Project location on the eastern portion of the 137-acre parcel minimizes the length of the electric and gas interconnects across the site reducing ground disturbance and visual impacts.

2.3 Wetland Functions and Values

2.3.1 Wetland Classes, Functions, and Values

A functional assessment of wetlands and watercourses in the proposed project area was performed by TRC based on qualitative wetland functional value definitions provided in the Connecticut Bulletin Number 9 entitled "Method for the Evaluation of Inland Wetlands in Connecticut" (Ammann, Franzen, & Johnson, 1986). This method and the wetland functional

definitions are effectively similar to the Corps' "Wetlands Functions and Values – A Description Approach" (Sept. 1999). The functional assessment conducted for on-site wetlands and watercourses identifies the principal functions exhibited by each resource as well as any characteristics observed or inferred the transition or evolution of these excavated areas to wetland as a result of the cessation of mining activity and site runoff.

Wetland functional values of the subject wetlands and watercourse were assessed by TRC in the field by the observation of various physical site conditions, hydrology, soils, vegetation and vegetation associations, mapping resources, the application of current wetland science, and professional judgment. The wetland functional values assessment was conducted for the purpose of describing existing site characteristics and to compare project alternatives, avoid and minimize project impacts, determine the significance of impacts, compare the potential impacts against project benefits, and to design and monitor compensatory wetland mitigation. Table 2-1 summarizes the existing type and condition of resources located on the site, their assessed functional value, the proposed impacts to these areas, and proposed mitigation/compensation. A narrative characterization of the wetlands and their relative wetland functions and value is provided in Attachment A.

2.4 Mitigation Design Considerations

Based on the alternatives analysis, mitigation rationale reviewed in Section 2.2 KES proposes the following wetland compensation and enhancement.

2.4.1 Proposed Wetland Compensation and Enhancement

As stated in previous sections and summarized in Table 2-1, the proposed wetland replacement and enhancement plan goals are to replace and restore existing wetlands and relocate the watercourse sections affected by the proposed access road and energy facility. KES proposes to compensate for wetland and watercourse impacts with the following:

- Total Wetland Replacement – 17,103 sq. ft. (compensation for wetland fill in Areas 3, 5, 6 and 8).
- Total Vernal Pool Compensation –

| | |
|---------------------|---|
| Area 3 Vernal Pool | 1,060 sq. ft. (compensation for Area 5) |
| Area 1A Vernal Pool | 5,395 sq. ft. (compensation for Area 5) |
- Total Wetland Enhancement –

| | |
|-----------|---|
| Area 3 - | 11,500 sq. ft. (to remove mine tailings and invasive species) |
| Area 10 - | 7,712 sq.ft. (enhance existing wetland and convert upland adjacent to Area 10). |
- Total Watercourse Restoration – 180 ln. ft.(compensation for Area 4 (watercourse fill)).

As discussed with the CT DEP, existing soils in Area 3 and Area 10 that area covered with *Phragmites* will be replaced in accordance with proposed enhancements described in Section 6.3

and replanted with more suitable wetland species (see Section 5.1). The wetland replacement will have nearly the same relative hydrologic position and sub-drainage watershed, however, the soil replacement will improve existing wetland functions once the refill area and grading has been completed. Wetland vegetation planting phases will occur during the Spring (between March 21 and June 15) or the Fall (between October 15 and November 15) as described in Section 6.0.

In addition, to off-set “temporal losses”, that is, loss of existing wetland functions on the site as a result of the passage of time between when the wetland is filled and when compensatory wetland is developed, KES is proposing additional compensatory mitigation through restricted land use of a 51.3-acre “Reserve Area” (see Section 1.7). Sections 3.0, 4.0, 5.0 and 6.0 describe the design components of the MP, including wetland and watercourse hydrology, grading plans, soil specifications, and planting plans.

2.4.2 Mitigation Construction Timing and Sequence

Not all the proposed mitigation area will be constructed at the same time. Individual mitigation/compensation area construction will be closely phased with the construction phasing for access roadway, letdown areas, the facility site, and temporary and permanent storm water management construction activities. Due to the size, steepness, and the disturbed nature of the site, development of the site requires substantial “cut” and “fill” phases to prepare level and safe work, letdown, and parking areas, and to construct safe roadway grades that meet local code requirements (e.g. grades no steeper than 10% grade).

The MP area excavation will initially revolve around the construction grading phases for the roadway development as well as construction of storm water control structures that meet CT DEP design code specifications and permit stipulations. In general, mitigation areas located within the each construction phase will be initiated (graded) within 90 days and completed no later than the completion of the permitted project.

The detailed construction phasing and grading sequence drawings are provided in the KES project drawing package plans entitled “Construction Phasing and Erosion Control Plans” provided under separate cover. Table 2-2 summarizes the general anticipated construction activity sequence presented on the phasing drawings. Figure 1-3 in the MP depicts the overall plan view of the site drainage system for the development areas and depicts the specific MP areas. Drawing C16 - “Post Development Plan of Waterways” in Attachment B depicts the overall construction limits, drainage (“waterways”) and the location of wetlands and wetland mitigation compensation areas. For the complete hydrologic analysis conducted to support the grading and storm water management plan for the site, refer to KES Storm Water Management Design Technical Reports under separate cover.

Table 2-2
Primary Construction, Storm Water Control Activities and General Mitigation Construction Sequence

| Construction Activity | Grading Plan Reference | Associated Storm Water Control Features ¹ | Mitigation Area/Type of Mitigation | Mitigation Area Reference Plans and Summaries |
|---|--|--|--|---|
| Phase 1: Establish work limits, initial staging areas, River Road drainage improvements, site clearing. Grade site access road section from STA 5+00 to 24+00. | C8-C9; C18 – Plan Waterway B (refers to roadway grade profiles. | Establish E&S controls and construct S.A.#1 and S.A. #9 and Stilling Basin C21 and C24 | No mitigation activity | No mitigation activity |
| Phase 2: Grade site – initiate cut and fill in letdown & parking and power block areas (Sta. 24+00 to 31+00). | C12 | Initiate construction of drainage channels south of upper letdown and power block areas. Maintain E&S controls. | Excavate wetland enhancement Area 10. Plant vegetation according to MP. | Figure 1-3, Figure 1-3A and B. Table 2-1 See Area 10 on C12 |
| Phase 3: Continue cut, fill and grading in upper letdown and power block areas. Construct box culvert at Sta. 35+00 (north of Area 3 (wetland), and start gabion wall along Area 4 (watercourse). | C12, C14 and C26 | Fill and construct S.A. #2 and #4 (see C1, C12, & C23 and perimeter channel on south side of letdown and power block areas. Maintain E&S controls. | Begin Area 3 (wetland) construction and enhancement as box culvert and road fill is completed. Plant vegetation according to MP. | Figure 1-3 Table 2-1 C-26 Area 3 |
| Phase 4: Continue grading site access road to power block (STA 34+00 to 42+70). Construct power block foundations, utility areas, etc. | C12, C13, C14 and C26; and Waterway "A" C17 (Area 4 watercourse) | Construct S.A. #7 Construct/fill/culvert section of Area 4/watercourse. Maintain E&S controls. | Complete Area 3 replacement wetland and wetland enhancements in Area 3 and Area 6, and S.A. #7 watercourse. Cover; C26 and Waterway "A", C17 (Area 4 watercourse). | Figure 1-3 Table 2-1, C26; and Waterway "A" C17 (Area 4 watercourse) and C13 (Area 6 Enhancement) |
| Phase 5: Construct Power Block, electric, gas and oil facilities. | C13 and C14 | Construct SA#6 and SA#7; Grading Plan - C26 Sheet 10 of 15 and C27 Sheet 11 of 15. Maintain E&S controls. | N/A | Figure 1-3 Table 2-1 |

Notes:

¹SA= Sediment Area (basins)

2.4.3 Compensatory Mitigation Responsible Party

Project mitigation planning and design was developed by TRC using the grading and storm water management design and plans developed by PB Power, Inc. on behalf of KES. Following agency approval of the final erosion and sedimentation detailed plans submitted for each phase of construction, KES will contract with a Engineering and Procurement Contractor (EPC) who will be responsible for completing final detailed site grading contours, erosion and sedimentation control details, construct roadways, facility buildings, the storm water management structures, and construction of compensatory mitigation areas. A landscape contractor will be contracted to purchase and plant proposed wetland seed, nursery plant stock, and transplant stock from areas on the site under supervision of a wetland specialist. The wetland specialist will be on-site to monitor the construction of wetland mitigation/compensation areas and the planting phases to ensure compliance with the MP.

2.4.4 Erosion and Sedimentation Control Measures

There are two existing open water quarries (Area 1 and 1A) that are up-gradient of the project development site and will not be subject to construction impacts or erosion hazards. The construction areas of the site, including compensatory wetland mitigation areas will be protected from erosion and sedimentation through the implementation of Best Management Practices (BMPs) prepared as part of the final KES Erosion and Sediment Control Plan (an outline of the E & S Control Plan is provided in Attachment C.) The project erosion and sedimentation control plans are shown on the Construction Phasing and Erosion Control Plans approved by the CT DEP under separate cover. The proposed BMPs will minimize erosion, the migration of sediments, and adverse impacts to the wetland/watercourse on the site. These BMPs will include the use of detention ponds, stone lined swales and check dams with temporary sediment traps, and haybale and/or silt fence barriers to minimize erosion and sedimentation installed in appropriate locations during temporary construction phases as well as outside the limits of construction and stabilized construction roadways.

During construction phases and during facility operations, storm water will be controlled according to existing sub-drainage areas on the site and site grading activities. The proposed storm water system will be constructed in phases as the site is developed, and will reduce peak storm water flows on the site. The proposed sedimentation basins located within the Facility "footprint" (designated with the prefix "S.A.") have been sized to correspond with their respective sub-watershed area to capture peak flows, settle suspended sediment, and discharge to secondary "wet ponds" and wetland areas with improved water quality characteristics. Proposed wetland compensation areas will provide additional storm flow attenuation, water quality enhancement, while enhancing wetland and wildlife habitat. Calculations prepared in support of the Storm Water Management Plans are provided to the CT DEP under separate cover.

Specific design features of the proposed Erosion and Sedimentation (E&S) Control Plan will provide effective sediment and erosion control and maintain runoff water quality within the wetland and watercourse areas during phases of construction. Features include a series of temporary and permanent appropriately sized catch basins, rock-lined and/or grass-lined swales/ditches that direct facility storm water runoff to permanent detention ponds. Like pre-

construction site conditions, water will drain from control structures to the wetland and "wet" pond areas.

Temporary E&S haybales, and other devices and structures to control erosion and sedimentation in the around mitigation sites shall be included in the facility E&S Plan and properly maintained at all times. These devices and structures shall be disassembled and properly disposed no later than November 1 or three full growing seasons after planting. Substantial sediment collected by these devices will be removed and placed in upland in a manner that prevents its erosion and transport to a waterway or wetland.

3.0 HYDROLOGY

The wetlands and watercourse segments identified on the site developed into the wetland/watercourse existing complex after the cessation of mining activities on the site. The principal water source for several of the existing wetlands (i.e. Area 3, 6, and 7), which are hydraulically connected through a cascading grade on the site, is the central surface watercourse we have designated in watercourse sections called Area 2, 4, 7, and 9. Existing conditions and historic plans available to TRC provide evidence that the central watercourse was built to convey runoff through or into these quarries and detention areas (Areas 3, 5, 6, and 7) constructed during phases of former mining operations to control flow velocities and convey surface flow draining off the site. Field observations of Area 1 (quarry) indicate that groundwater that seeps into the quarry discharges through a rock overflow outlet constructed at Elevation 389.9 feet. As shown on C17 – “Profile Waterway A” in Attachment B, this watercourse drops from approximately elevation 340 feet to elevation 100 feet across the disturbed portion of the site (from south to north).

The central wetland and watercourse complex is currently functioning as a means of attenuating the velocity and the sediment load of the water draining the site to the north, eventually to the Connecticut River. While we believe there is minor ground water contribution conveyed to the existing watercourse and associated wetland quarries, the geology of the site and existing field conditions provide the evidence to conclude that this wetland and watercourse complex is primarily a surface water system. Other wetlands on the site (Area 5, Area 8, and Area 10) are all constructed isolated quarries or detention areas that retain water because they are situated on ledge.

The hydrology and associated grading on the site are shown in the series of grading plans and profile sections provided in Attachment B. The hydrologic calculations and evaluations that define and support the evaluation the pre- and post-construction hydrology for the site Storm Water Management System and the MP design are provided in technical reports provided under separate cover to the CT DEP.

The central drainage hydrology of the site will be maintained and improved with the proposed mitigation plan by controlling the peak flows conveyed on the site, and settling sediment in sediment basins prior to discharge to the wetland/watercourse drainage system. The proposed Area 3 Wetland replacement mitigation area will receive the pre-development surface and ground water at existing hydro-periods associated with Watersheds 4A and 4B (see C5 and C6 “Existing Site Drainage System Plan” in Attachment B. The invert outlet (two 4' x 6' culverts) for Area 3 Wetland has been designed to minimize storm water surcharge behind the culvert and Wetland 3. Storm water runoff discharge and water level elevations are summarized in Table 3-1 for the area contributing to Area 3. As shown on Table 3-1 and the profile drawing on C26 and C26A, the peak runoff for the 2-year storm event would raise the water level in the Area 3 wetland less than one foot (0.58 feet) above the invert. The invert elevation, that is, the maximum water level of Area 3 is 305.8. Predicted normal wetland soil saturation is approximately elevation 304.0.

Table 3-1
Post Development Runoff (Surcharge) To Area 3 Wetland
(upgradient of Box Culvert Ele. 305.8 (see C26))

| Watershed 4B & Partial 4A | | |
|--------------------------------------|-------------------------|------------------------------|
| <i>Storm Event (24-hour)</i> | <i>Runoff Discharge</i> | <i>Water Level Elevation</i> |
| 2-year | 31.41 | 306.38 |
| 10-year | 86.78 | 307.39 |
| 25-year | 109.7 | 307.81 |
| 100-year | 172.8 | 308.61 |

The MP herein primarily incorporates the wetland mitigation areas within the central wetland/watercourse drainage system in order to replicate and enhance the principal existing function this drainage system serves, that is, runoff flow and attenuation. KES proposes to replicate this runoff function through a series of wetland, wet pond, and watercourse components, similar to what is currently on the site, and designed to not only restore the wetlands and watercourse conditions that have evolved, but improve water quality flowing in to and out of the watercourse and wetlands, and improve potential wildlife habitat in these areas.

Table 3-2 summarizes the cross-references of the plans for the watercourse and wetland mitigation areas.

Table 3-2
Watercourse and Wetland Mitigation Compensation Area
Summary and Hydrology Plan Reference¹

| Watercourse or Wetland Area Designation/Proposed Alteration | Drawing Reference | Watercourse/Wetland Reference Section and Grade Elevation | Hydrology Details |
|--|--|---|---|
| Area 2 – Watercourse Channel/re-channel through box culvert for facility access road (Sta.35+00) | C13 Plan Waterway A | C13 and C26 and Section Invert Elevation 305.8. | Channel Slope +/- 1% with 10 to 1 water fall. |
| Area 3 – Wetland/Replacement Area (17,103 and Enhancement Area (11,213 sq. ft.) | C13 and C26 Plan Waterway A | C17-Waterway "A" and C26. | Nominal Water elev.= 305.8 Bottom elev. = 299.8 |
| Area 4 – Watercourse Channel / fill over box culvert for facility access road (180 ln. ft.) | C12/C13 | See C17 Profile Waterway "A" (Sta. 9+00 to 11+00) Elevation ~270 to 225 ft. | Existing Channel Slope Watercourse flows to waterfall and to Area 6 wetland. (C13).. |
| Wetland Area 5/fill for site grading. (5,761 sq. ft.) | C13 see Area 3 Replacement on Plans C26 | N/A | Area 5 is an isolated wetland with vernal pool characteristics (becomes dry in summer) |

Table 3-2
Watercourse and Wetland Mitigation Compensation Area
Summary and Hydrology Plan Reference¹

| Watercourse or Wetland Area Designation/Proposed Alteration | Drawing Reference | Watercourse/Wetland Reference Section and Grade Elevation | Hydrology Details |
|--|--|---|---|
| Wetland Area 6/fill (5,603 sq. ft.) | C26 See Area 3 replacement wetland area | See C17 Profile Waterway "A". | Water source - Area 4 watercourse on C13; Surface Elevation = 217.8 Bottom Elevation = 215.3 |
| Wetland Area 7/No fill | N/A | N/A | Water source is Area 4 waterfall and Area 6 quarry wetland |
| Area 8 Wetland/fill (7,363 sq. ft.) | See Area 3 replacement wetland area | N/A | Isolated wet quarry bottom; dries during summer. |
| Watercourse 9/re-channel to include S.A. #9 | C10 | C23 (Sheet 7 of 15) Section D | Invert out Elevation 110 feet |
| Area 10 - Wetland/reconstruct as larger wetland with enhancement (existing area 4,439 sq. ft.) | C12 and Figure 1-3, Figure 1-3A | Enhance by converting to vernal pool at elev. 335.5 | Water source groundwater seep and surface water drainage (see C11 and Figure 1-3 and Figure 1-3A and Figure 1-2). |

Notes:

¹ KES Storm Water Management/Hydrologic Calculations under separate cover.

4.0 GRADING PLANS

The overall grading plan, including earth "cuts" and "fills" for the proposed facility, access road, storm water management system, and compensatory wetland mitigation areas is shown on C8 – C-15 (see Attachment B). Drawings that specify grading plans for the project and incorporate the wetland and watercourse compensatory mitigation area are summarized in Table 4-1. Generally, the grading of compensatory and enhancement wetland areas will occur following major development site construction grading phases described in Section 2.4.2 and with the complete project Construction Phasing and Erosion and Sediment Control Plans provided to the construction contractor. Grading and soil replacement in Area 3 and Area 10 wetland enhancement areas are described in Section 5.0.

| Table 4-1 Grading Plan Cross-Reference | |
|--|---|
| Effected Wetland or Watercourse | Grading and Mitigation Plan Grading Figure/Drawing No. |
| Area 2 (watercourse) No grading proposed except for vernal pool construction | Figure 1-3 and C26 |
| Area 3 Wetland Replacement and Enhancement | Figure 1-3, Figure 1-3B and C26 |
| Area 4 (watercourse) | C13 and C14, C26 and Profile Waterway A (watercourse) |
| Area 5 (isolated quarry wetland) | C13 (see C26 Wetland Area 3 Replacement Plans) |
| Area 6 (quarry wetland) | C13 (see Area 3 Wetland Replacement Plan C26) |
| Area 7 (wetland/watercourse) | C10 (no wetland/watercourse fill) |
| Area 8 (wetland/quarry) | C12 (see Area 3 Wetland Replacement Plan C26) |
| Area 9 (watercourse) | C10 and C24 |
| Area 10 (wetland/quarry) | Figure 1-3, Figure 1-3A and C |

5.0 SOILS

5.1 Wetland Soil Restoration/Replacement

As previously noted in Section 2.1, the proposed Project development areas, including wetlands areas, are located on previously blasted rock, or mine tailing fill areas over ledge, or directly on ledge. The surface terrain consists of obvious remnants of extensive mining, i.e. rock and soil barrow piles, excavated quarries and ledges, mine tailing piles, and a network of construction roads and drainage ditches (see Figure 1-2 Existing Site Drainage Plan). Evidence of original topsoil on the entire parcel is minimal.

Prior to proposed wetland fill and grading activity, wetland soils in areas to be filled (i.e. Areas 3, 5, 6, and 8) will be inspected for possible use in wetland compensation areas. Preliminary field inspection of these soils indicates that they consist of primarily mixed mineral materials, mining tailings, fractured soils, or solid ledge, and therefore, possess little or no topsoil or organic matter suitable for trans-location and re-use. These soils do possess some useable wetland herbaceous and shrub root-stock and seed bank along the fringes of the wetlands that may be trans-located to compensatory wetland areas (such as sedges in Area 5 and Alders in Area 8 and Area 10). As such, a Wetland Scientist will determine how much of existing soil, generally soil associated with transplant stock or areas that are not mine tailings, should be used in the wetland replacement areas. The assessment of suitable soils will be based on organic content, root and seed bank species content, amount of "nuisance or invasive species" pre-existing in the material, and the nature and extent of underlying mineral soil content (e.g. if the underlying mineral material is exclusively mining tailings, then these soils may not be used).

All wetland mitigation construction areas are summarized in the far right column of Table 2-1. Area 3 (~ 17,103 sq. ft.) will serve as the primary wetland replacement wetland compensation area for Area 5, Area 6 and Area 8 wetland fill areas, (Area 5 and Area 8 are isolated wetlands). Area 3 is located west of the development area, affords suitable hydrology, and borders the undeveloped Reserve Area.

Organic wetland topsoil will consist of at least a 50-50 organic and mineral mix using leaf compost free of weeds as a soil amendment and will be similar to natural hydric soil nutrient and organic content found in nearby undisturbed wetlands. Soil amendments will have a minimum range of 4-12 percent carbon content on a dry weight basis with final carbon content determined at the time and place of soil application, since different portions of the mitigation will need different amounts (e.g. lower for ponds; higher for new wetland creation areas). Specific carbon content shall be determined for each mitigation area prior to field application using laboratory analyses if necessary. Table 5-1 summarizes the existing and proposed soil or substrate composition relative to wetland plant composition or watercourse bed characteristics. Soil replacement plans are described in the foregoing sections, and vegetation plans are provided Section 6.0.

Table 5-1
Existing Soil and Substrate and Proposed Wetland & Watercourse Replacement
Grading and Soil Composition

| Wetland or Watercourse Designation | Existing Soil/Substrate Composition ¹ | Proposed Soil/Substrate Composition ² | Grading Plan Cross-References for Compensation/Mitigation Areas |
|-------------------------------------|---|--|---|
| Area 2 (Watercourse) | Lg. boulders, boulders, embedded rubble | No change to existing channel, however propose boulders and embedded rubble for intermittent drainage to proposed Vernal Pool habitat in Area 3. | C26-Plan view. |
| Area 3 (emergent wetland) | Primarily mine tailings and fine sand. | Man-made soil amendment (see Section 5.1). | C26 Plan and Profile - Area 3 Wetland |
| Area 4 (watercourse channel) | Boulders, embedded rubble | Proposed box culvert and watercourse substrate from S.A. #7 with boulders, embedded rubble over channel protection in channel. | C26-Area 4 Watercourse downstream of Wetland 3. |
| Area 5 (detention area) | Mine tailings and excavated mineral soil; boulder overflow structure. | Man-made soil amendment (see replacement wetland Area 3) | C26- see Wetland 3 Compensation Area w/Wet Pond Plan View (Sheet 6 of 15) |
| Area 6 (quarry wetland) | Deep steep-walled quarry with mine tailings. | Man-made soil amendment (see additional compensation in Area 3) | C26 - see Area 3 replacement wetland and vernal habitat and Area 10 Wetland habitat (Figure 1-3A) |
| Area 7 (watercourse and wetland) | Watercourse deposition material, mine tailings, sand, and silt. | No fill proposed. | C26 |
| Area 8 (watercourse and culvert) | Deep steep-walled quarry with mine tailings. | Man-made soil amendment (compensation in Area 9 Wet Pond). | C26 - see Area 3 replacement wetland. |
| Area 9 (watercourse) | boulders, embedded rubble on bedrock | Bedrock basin & boulders, embedded rubble over channel protection. Create S.A.#9 for flow attenuation. | C10 |
| Area 10 (quarry wetland) | Deep steep-walled quarry with mine tailings. | Man-made soil amendment | Area 10 Plan View Figure 1-3, Figure 1-3A and C12 |

Notes: ¹ lg. boulder (>46 cm), boulder (25-45 cm), rubble (6-25 cm), gravel (6-60 mm), sand (0.6-6 mm)/% beddedness, dry ground.

² See Section 5.1 of Wetland Mitigation Plan for soil amendment composition descriptions.

5.2 Watercourse Substrate Replacement

The proposed access road to the facility will require filling approximately 360 linear feet of steep rocky watercourse down-gradient of Area 3. KES proposes to reconstruct approximately 240 linear feet stream down-gradient of S.A. #7. Watercourse bed and bank will be replaced using on-site stone and boulders placed on underlying storm water channels that are designed to resist channel erosion during high intensity storm events (i.e., 100-year storm event). During watercourse re-construction, a Wetland Specialist or Hydrologist will be retained to advise the contractor during the placement of stone and boulders to facilitate the construction of a watercourse channel that will have a combination of small plunge pools, a variety of substrate stone, and stream meander.

shall be relocated to locations with suitable hydrology and soils and where appropriate structural context with other plantings can be maintained. The plant species selected for each mitigation wetland area zone are listed in the following paragraphs.

6.2.1 Deep Marsh Zone

Within the deep marsh zone, a wetland seed mix containing at least the following species will be planted. Rooted nursery stock may also be planted to expedite mature plant development.

Scirpus validus (soft-stem bulrush)
Scirpus acutus (hard-stem bulrush)
Pontederia cordata (pickerelweed)
Nymphaea odorata (white lily)

Rooted nursery stock may be planted to expedite mature plant development.

6.2.2 Shallow Marsh Zone

Within the shallow marsh zone, a wetland seed mix containing the following species will be planted. Rooted nursery stock may be planted to expedite mature plant development.

Sparganium americanum (burreed)
Sagittaria latifolia (arrowhead)
Scirpus americanus (common three-square)

6.2.3 Wet Meadow Zone

Within the wet meadow zone, a wetland seed mix containing some or all of the following species will be planted:

| | |
|--|---|
| <i>Carex stricta</i> (tussock sedge) | <i>Carex crinata</i> (fringed sedge) |
| <i>Carex lurida</i> (lurid sedge) | <i>Glyceria canadensis</i> (Canada manna grass) |
| <i>Scirpus atrovirens</i> (green bulrush) | <i>Verbena hastata</i> (blue vervain) |
| <i>Eupatoriadelphus maculatus</i> (joe-pye weed) | <i>Scirpus cyperinus</i> (woolgrass) |
| <i>Carex lupulina</i> (hop sedge) | <i>Panicum rigidulum</i> (red-top panic grass) |
| <i>Eupatorium perfoliatum</i> (boneset) | <i>Carex comosa</i> (bearded sedge) |

The seed mix will be applied in the late fall (after October 15) or early spring (early March) to provide the soil moisture and temperatures suitable for successful germination. The recommended application for a wet meadow is 1 pound per 2,500 square feet. The seed will be applied using the hydro-seed method with annual rye seed to assist in stabilizing the soil. Jute matting may also be used to minimize the potential for soil erosion and prevent seed from being washed away. Such cover methods will also provide moisture holding capacity and micro-shading.

6.2.4 Scrub/Shrub "Edge-Effect" Zone Planting Plan

Shrubs or woody plantings will be planted along the fringes (on the wetland side) of the wetland marsh and wet meadow zones described in Section 6.2.3. The scrub/shrub edge planting plan will use a planting density sufficient to provide a thicket cluster designed to provide shading and wildlife cover with an average density of four shrubs 4-6 feet high per 500 square feet or at approximately 10-foot intervals. Straw mulch, burlap, or jute matting will be used around woody plantings to assist in moisture content retention. In addition, wetland fringes and in appropriate locations within mitigation Areas 3 and Area 6, will be enhanced by placing coarse woody debris at various stages of decomposition (root mass/stumps, small branches and logs), and scattered boulders.

Scrub/Shrub Plant Species

- *Lindera benzoin*
- *Vaccinium corymbosum*
- *Alnus rugosa*

Tree Species

- *Betula lenta*
- *Acer rubrum*
- *Tsuga canadensis*

6.3 Vernal Pool Compensatory Habitat

TRC, in consultation with the USFWS, conducted a field survey within the 51.3-acre Reserve Area to determine the potential for conserving and enhancing vernal pool habitat lost by filling Area 5, and to generally characterize temporal areas outside the proposed facility development area with respect to wildlife use. Two areas (designated as MA1 and MA2 on Figure 1-2A) were identified as existing potential vernal habitat developed in previously excavated quarries near Area 1A. The area south of Area 1 (quarry pond) along Area 2 watercourse was identified as a potential area suitable for a vernal pool enhancement area. TRC and the USFWS concurred that MA1 has sufficient vernal pool characteristics, indicator species, and "buffer habitat", and therefore, does not warrant enhancement for vernal pool habitat management other than to maintain a "buffer" provided by the establishment of the Reserve Area, however, MA2 was determined to be a suitable location (i.e. suitable topography, hydrology) for vernal pool compensatory habitat. MA3 (also designated as Area 10 quarry wetland) has limited potential for vernal pool habitat beyond the quarry area. Because it is a three-sided quarry, it can only be graded into a basin or pool configuration to the north, and may be planted with the intent of attracting vernal pool species.

The basic physical design criteria to be used for the proposed compensatory vernal pool areas, including the enhancement of Area 2/Area 3, and Area 1A for vernal pool habitat included:

- water retention for approximately 2 months during the early growing season;

- a confined depression that lacks a permanent outlet watercourse and has suitable topography and soils;
- the Absence of fish and the potential to keep fish from populating the area; and
- has potential vernal pool buffer area.

KES proposes to mitigate the potential temporal loss of amphibian and reptile species that may breed in Area 5 by trans-locating any eggs and adults from this area that may be found during the spring or fall months of the breeding seasons to MA2 or directly into the proposed compensatory vernal pool sites if they are graded in time for the breeding season. This will be conducted by a qualified Wetland Biologist and at the appropriate seasonal egg gestation period. Following the construction of the compensatory wetland mitigation areas, these areas will be surveyed, and if there are sufficient amphibian and reptile eggs present in MA1 and MA2 during the following breeding season, some of these egg masses will be trans-located to Area 3, Area 6, and Area 10. Details concerning the construction and planting of vernal pool habitat are included in the following sections.

6.3.1 Vernal Pool Grading and Hydrology

The proposed vernal pools, one within Area 3 Wetland Mitigation area and one adjacent to Area 1A will be graded at the following approximate bottom elevations as determined with confirmatory ground survey at the time of construction. Details for constructing these vernal pool areas, as well as the grading and hydrology enhancement for Area 10 area as follows.

6.3.1.1 Area 3 Wetland Vernal Pool (see C26) – Proposed bottom elevation 317.0 (based on spot elevation in Area 2 watercourse and Area 3 which are slightly sloping from south to north.).

6.3.1.2 Vernal Pool Adjacent to Area 1A (see Figure 1-3B – Proposed bottom elevation 410.2 (based on the existing water level elevation of Area 1A Quarry, i.e. 411.1 feet) and a vernal design basin maximum depth of two feet.

6.3.1.3 Area 10 Wetland Enhancement – Bottom elevation 335.5. Wetland Area 10 is an existing quarry with an isolated wetland located at elevation of approximately 338.0 feet (quarry bottom with mine tailings). Prior to construction, the edges of Area 10 will be located by using GPS coordinates taken at the wetland boundary (i.e. the quarry wall-toe edge) during the grading of the proposed letdown area located directly east of Area 10. Wetland Area 10 will be re-graded to remove existing topsoil. Care will taken to re-grade the area to continue to intercept ground water (the groundwater seep area is located directly south) at approximately elevation 338.0 or below, and flow into a basin with a bottom elevation of approximately 335.5. In addition, as shown on Figure 1-3A, it will receive additional surface water flow with the slight diversion of hillslope flow from an intermittent drainage shown on Figure 1-3. This drainage will supplement the hydrology of the hydrology of Area 10 to encourage saturated conditions that would support a wetland plant community, and possibly also attract vernal pool species. This hydrologic

condition will be monitored to ensure proper vegetation development and ponding characteristics.

6.3.2 Soils (Area 10)

The existing soil for the construction of the two proposed vernal pool areas will consist of a mix of mineral soil and composted leaf material obtained locally in accordance with a 50/50 organic matter and mineral mix ratio (see Section 5.1). Once the basin has been sub-graded, 6 to 8 inches of man-made soil will be spread evenly in the basin to achieve final grades in preparation of wetland species planting.

6.3.3 Vegetation (Area 10)

Area 10 mitigation area is a quarry bottom wetland vegetated with primarily *Phragmites* and *Equisetum* spp.. The opening of the quarry, facing north is lined with mature *Alnus incana* (speckled alder). Prior to re-grading, the alder will be pruned to approximately six feet and the root mass of each shrub will be excavated and set aside nearby for replanting. The alder root masses will be set grouped together, excess soil will be loosely packed around them, and straw mulch will be placed on top to prevent soil drying. Once re-graded to the design grade, Wetland Area 10 will be replanted with plant species similar to vernal pool buffer habitat because much of the area to west and south consist of tree species suitable for scrub/shrub or forested wetland and vernal pool habitat. A combination of re-planted alder, wetland emergent and shrub species plantings, and wetland herbaceous seed mix will be planted in Area 10.

The enhanced wetland vegetation zones for Area 1A and Area 3 area shown on Figure 1-3, Figure 1-3A and B. Vernal pool planting zones are also proposed for the Area 10 enhancement area. All three of these areas will be planted with the following species zones.

Zone 1 – Tree and Shrub Fringe

- Transplanted Alders (*Alnus incana*)
- Additional Alder (*nursery stock*)
- Red Maple (*Acer rubrum*)
- Red Osier Dogwood (*Cornus sericea*)
- Wild Raison (*Vaccinium cassinoides*)

Zone 2 – Emergent Fringe

- Cinnamon Fern (*Osmunda cinnimomea*)
- Sensitive Fern (*Onoclea sensibilis*)
- Hop Sedge (*Carex lupulina*)
- Ostrich Fern (*Matteuccia struthiopteris*)

Zone 3 – The sub-emergent pool basin will be covered with leaf litter

6.4 Invasive Species Control

Phragmites found in the existing plant community in several of the wetlands to be filled (i.e. Wetland Area 3, Area 6, Area 8, and Area 10), will be controlled in the restoration areas to the extent possible during the soil transport process. Indeed, in the areas that are completely dominated by *Phragmites* on the site, existing soils and root masses will not be re-used in the wetland compensation areas in order to minimize the risk of transplanting this invasive species. *Phragmites* will also be controlled during the monitoring period. This shall be accomplished by early removal or by treating the *Phragmites* after the tasseling stage (gone to seed) in August or September. If the *Phragmites* is mixed with other vegetation, *Phragmites* stem shall be individually treated with herbicide. If the *Phragmites* is grouped, the herbicide may be sprayed over the stand. The applied herbicide shall be a 5% solution of either Rodeo or Roundup which are approved for use in wetlands. Rodeo will be used in areas of standing water. Roundup shall be used in all other areas for other nuisance species. Treatment will be performed in the first year following construction completion and for four subsequent seasons. Rodeo shall not be applied if rain is forecast within 24 hours.

7.0 POST-CONSTRUCTION MONITORING AND REPORTING

During the grading and planting phases of wetland mitigation recreation and enhancement, a qualified wetland specialist will monitor the construction of wetlands, wet ponds, and watercourse restoration activities for compliance with the MP. A photo log will be established as well as an "as built" plan, which will be used in foregoing mitigation monitoring and reporting.

In accordance with the Corps Wetland Mitigation Guidance and Standards, for each of the first five full growing seasons following construction of the mitigation sites, the proposed emergent wetlands and vernal pool sites will be monitored according to four "success standards" outlined in Section 7.3 for five years. Vernal pools will be monitored for obligate and facultative species weekly for four weeks from the beginning of the typical vernal pool activity for the Middletown area in the spring. Monitoring reports submitted no later than December 15 of the year being monitored. The post-construction monitoring assessments will be comprised of the following elements.

7.1 Monitoring Assessment Plan and Report

7.1.1 Assessment Plan

Following completion of the construction of the mitigation sites, a post-construction assessment of the condition of the mitigation sites shall be performed after the first five growing seasons or by the end of the monitoring period, whichever is later. Assessments shall be performed at the end of each monitoring period. "Growing season" in this context begins no later than May 31st. To ensure objectivity the person who prepares the Monitoring Report shall not perform the field assessment without written approval from the ACOE. The assessment report shall be submitted to the ACOE by December 15th of the year the assessment is conducted.

The post-construction shall include the four appendices listed below and shall:

- Summarize the original or modified mitigation goals and discuss the level of attainment of these goals at each mitigation site.
- Describe significant problems and solutions during construction and maintenance (monitoring) of each mitigation site.
- Identify agency procedures or policies that encumbered implementation of the mitigation plan. Specifically note procedures or policies that contributed to less success or less effectiveness than anticipated in the mitigation plan.
- Recommend measures to improve the efficiency, reduce the cost, or improve the effectiveness of similar projects in the future.

7.2 Photographic Stations

To visually document plant community development, photographic stations will be established within the wetland restoration area. In addition, quantitative sampling of the wetland plant

community will also be undertaken using the techniques illustrated below. Photographs will be taken at each vernal pool bi-weekly monitoring event during the spring.

7.3 Sampling Protocol

A single observation plot or linear transect appropriately determined by the size of the mitigation or planting area will be established within each wetland restoration area perpendicular to both contour intervals and topographic gradients. For transects, each end of the transect will be marked with a permanent wooden stake. Along the transect, 25cm x 50cm rectangular quadrats will be positioned at regular intervals and will also be marked in the field. The same plots will be used during the second sampling season. In this manner, changes in plant percent cover and species composition over the two growing seasons will be accurately determined.

Percent cover will be determined by visually estimating percent cover of both plants and bare substrate within each 25cm x 50cm rectangular quadrat. Once these data have been collected, each plant species will be assigned its respective USFWS indicator status category. Relative percent cover will also be determined by dividing the percent cover total for a given class by the total percent cover for all species and bare space combined.

Assessment Appendices shall include:

Appendix A – Summary of the results of a functions and value assessment of the mitigation sites, using the same methodology used to determine the functions and values of the impacted wetlands.

Appendix B – Calculation of the area of wetlands in each mitigation site using the 1987 Wetlands Delineation Manual (TR Y-87-1). Supporting documents shall include (1) a scaled drawing showing wetland boundaries and representative observation plots; (2) data sheets for corresponding data gathered from observation plots.

Appendix C – Comparison of the area and extent of delineated constructed wetlands (from Appendix B) with the constructed wetlands proposed in the MP. This comparison shall be made on a scaled drawing or as an overlay on the as-built plan. This plan shall also indicate the major vegetation community types or zones.

Appendix D – Photos of each mitigation site taken from the same locations as the monitoring photos, including photos of proposed vernal pool mitigation sites.

7.4 Monitoring Reports

The Monitoring Reports shall also include a narrative describing the success criteria outlined in the sections below.

If mitigation construction is initiated in, or continues throughout the year, but is not completed by December 31 of any given year, the permittee will provide the Corps, Policy Analysis and Technical Support Branch, a letter providing the date mitigation work began and the work

completed as of December 31. The letter should be sent no later than January 31 of the next year. The letter must include the Corps permit number.

For each of the first five full growing seasons following construction of the mitigation site(s), the mitigation site(s) shall be monitored. Observations will occur at least two times during the growing season - in late spring/early summer and again in late summer/early fall. Each annual monitoring report shall be submitted to the Corps, Regulatory Division, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to perform the monitoring and submit monitoring reports constitutes permit non-compliance.

Each report coversheet shall indicate the permit number and the report number (Monitoring Report 1 of 5, for example). The reports shall answer the success-standard questions listed below, and shall address in narrative format the items listed after the questions. The reports shall also include the monitoring-report appendices listed below. The first year of monitoring shall be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the Corps, the permittee shall contact the Corps by phone 1-800-343-4789 or letter as soon as the need for corrective action is discovered.

7.4.1 Remedial Measures Guidance

Remedial measures shall be implemented at least two years prior to the completion of the monitoring period - to attain the success standards described below within five growing seasons after completion of construction of the mitigation site(s). Should measures be required within two years of the end of the monitoring period, the monitoring period will be extended to ensure two years of monitoring after the remedial work is completed. Measures requiring earth movement or changes in hydrology shall not be implemented without written approval from the Corps.

At least one reference site adjacent to or near each mitigation site is described and shown on a locus map.

7.4.2 Success Standards

Mitigation success shall be measured based on the questions and criteria enumerated below.

- 1) Does the site have at least 500 trees and shrubs per acre, of which at least 350 per acre are trees for proposed forested cover types, that are healthy and vigorous and are at least 18" tall in 75% of each planned woody zone AND at least the following number of non-exotic species including planted and volunteer species? Volunteer species should support functions consistent with the design goals. To count a species, it should be well represented on the site (e.g., at least 50 individuals of that species per acre).

| # species planted | Minimum # species required (volunteer and planted) |
|-------------------|---|
| 2 | 2 |
| 3 | 3 |
| 4 | 3 |
| 5 | 4 |
| 6 | 4 |
| 7 | 5 |
| 8 | 5 |
| 9 or more | 6 |

Vegetative zones consist of areas proposed for various types of wetlands (shrub swamp, forested swamp, etc.). The performance standards for density can be assessed using either total inventory or quadrat sampling methods, depending upon the size and complexity of the site.

- 2) Does each mitigation site have at least 80 percent aerial cover, excluding planned open water areas or planned bare soil areas (such as for turtle nesting), by noninvasive species? Do planned emergent areas on each mitigation site have at least 80 percent cover by noninvasive hydrophytes? Do planned scrub-shrub and forested cover types have at least 60 percent cover by noninvasive hydrophytes, of which at least 15 percent are woody species? For the purpose of this success standard, invasive species of hydrophytes are:

Cattails - *Typha latifolia*, *Typha angustifolia*, *Typha glauca* if not already dominant in adjacent wetlands;

Common Reed - *Phragmites australis*;

Purple Loosestrife - *Lythrum salicaria*;

Reed Canary Grass - *Phalaris arundinacea*; and

Buckthorn - *Rhamnus frangula*.

- 3) Are Common reed (*Phragmites australis*), Purple loosestrife (*Lythrum salicaria*), Russian and Autumn olive (*Elaeagnus* spp.), Buckthorn (*Rhamnus* spp.), Japanese knotweed (*Polygonum cuspidatum*), and/or Multiflora rose (*Rosa multiflora*) plants at the mitigation site(s) being controlled?
- 4) Are all slopes, soils, substrates, and constructed features within and adjacent to the mitigation site(s) stabilized?

7.4.3 Monitoring Report Narrative Requirements

Items for narrative discussion in the Monitoring Report are as follows.

- Highlighted summary of problems that need immediate attention (e.g., problem with hydrology, severe invasives problem, serious erosion, major losses from herbivores, etc.). This should be at the beginning of the report.

- Dates work on each mitigation site began and ended.
- Describe the monitoring inspections that occurred since the last report.
- Soils data, commensurate with the requirements of the soils portion of the 1987 Corps Delineation Manual (Technical Report Y-87-1) New England District data form, should be collected after construction and every alternate year throughout the monitoring period. If monitoring wells or gauges were installed as part of the project, this hydrology data should be submitted annually.
- Concisely describe remedial actions done during the monitoring year to meet the four success standards - actions such as removing debris, replanting, controlling invasive plant species (with biological, herbicidal, or mechanical methods), regrading the site, applying additional topsoil or soil amendments, adjusting site hydrology, etc. Also describe any other remedial actions done at each site.
- Report the status of all erosion control measures on the compensation site(s). Are they in place and functioning? If temporary measures are no longer needed, have they been removed?
- Give visual estimates of percent vegetative cover for each mitigation site and (2) percent cover of the invasive species listed under Success Standard No. 2, above, in each mitigation site.
- What fish and wildlife use the site(s) and what do they use it for (nesting, feeding, shelter, etc.). By species planted, describe the general health and vigor of the surviving plants, the prognosis for their future survival and a diagnosis of the cause(s) of morbidity or mortality.
- What remedial measures are recommended to achieve or maintain achievement of the four success standards and otherwise improve the extent to which the mitigation site(s) replace the functions and values lost because of project impacts?

Vernal Pool Enhancement Areas:

- Does the vernal pool creation take into account the critical need for unobstructed access to and from the pool, as well as an adequate extent of upland habitat to ensure success?
- Pool(s) are monitored for obligate and facultative vernal pool species weekly for four weeks from the beginning of the vernal pool activity in the spring (will vary throughout New England) and then biweekly until the end of July for the entire monitoring period. The period of monitoring is specified. Data identify frog species, salamander genera, and the presence/absence of fairy shrimp. Macro invertebrates can be identified to the order.
- In addition, photographs of the pool(s) taken monthly during the pool monitoring period (March/April-July) from a set location(s) will be included. Photographs will include panoramas of surrounding habitat.
- Other data required: pH and temperature of water at beginning and end of each monitoring cycle; pool depth at deepest point(s) (or state if >3') to nearest inch or

centimeter; substrate of pool(s) (dead leaves, herbaceous vegetation, bare soil—organic or mineral, etc.); plant species noted in and around the perimeter of the pool(s).

- If the state has a vernal pool register or certification program, the pool(s) is registered and/or certified prior to the final monitoring report submission.

The support documentation for the monitoring report shall include the four monitoring-report appendices listed below:

Appendix A: A copy of the Assessment Report.

Appendix B: A copy of this permit's mitigation special conditions.

Appendix C: An as-built planting plan.

Appendix D: A vegetative species list of dominant volunteer species in each plant community type. Dominant volunteer species will include those that cover over 5% of their vegetative layer.

Appendix E: Representative photos of each mitigation site taken from the same locations for each monitoring event.

ATTACHMENT A
EXISTING WETLAND RESOURCE CLASSIFICATION
AND
DESCRIPTION REPORT

KES Proposed Electric Energy Generation Site

**EXISTING WETLAND RESOURCE CLASSIFICATION
AND
DESCRIPTION**

Areas 1 and 1a (Watercourse- Open Water/Wetland Scrub-Shrub Fringe)

Areas 1 and 1A are deep quarries situated at nearly the highest point along the presumed site hydraulic gradient and are well out of the proposed construction layout. These watercourse ponds have developed within steep quarry walls as open water. A narrow channel with an extremely narrow scrub-shrub plant community adjoining a flat area that leads out of the basin within which flow is diverted over a series of small rock waterfalls forming an intermittent watercourse.

Dominant plant species observed within the fringe wetland community include *Vaccinium corymbosum* (highbush blueberry) and *Clethra alnifolia* (sweet pepperbush) with an admixture of *Myrica pennsylvanica* (bayberry) and *Kalmia latifolia* (mountain laurel). Scattered throughout the shrub fringe are *Acer rubrum* (red maple) and *Betula lenta* (sweet birch) saplings.

Soils along the edge of the basin were comprised of tailings remaining from former quarry operations. There is very little, and in many areas, no organic matter present in bordering areas. Soils within the scrub-shrub fringe could not be effectively described due to an inability to penetrate further than 3 inches into the bedrock substrate.

The water columns in the quarry basins were observed to be nearly clear throughout. Surface runoff and groundwater seep appear to be the source of water for the quarry. Water depths within the basin are unknown. Small fish were observed along the margins of the quarries during several site visits.

Area 2 (Watercourse)

Area 2 - watercourse appears to have been constructed with large rocks obtained during quarry operations. The channel area is currently dominated with young hardwood tree saplings and some relatively mature trees on nearby slopes. Dominant plant species observed within the tree stratum include *Betula lenta* (sweet birch), *Acer rubrum* (red maple), and *Betula populifolia* (gray birch). The dominant shrub species observed includes *Vaccinium corymbosum* (highbush blueberry). Within the understory, which was poorly developed, scattered patches of *Pilea pumila* (clearweed), *Polystichum acrostichoides* (Christmas fern) and *Polytrichum communis* (moss) dominated with only rare instances of *Onoclea sensibilis* (sensitive fern), *Smilacina racemosa* (false solomons seal), *Parthenocissus quinquefolia* (Virginia creeper), and *Clethra alnifolia* (sweet pepperbush) seedlings).

The plant community observed adjacent to the channel valley is also characterized as forested. Dominant plant species observed within the tree stratum adjacent plain included *Acer rubrum* (red maple), *Betula lenta* (sweet birch) with scattered *Ostrya virginiana* (American hophornbeam), *Betula populifolia* (gray birch) and *Populus deltoides* (cottonwood). All of these tree species exhibited shallow rooting systems, which in turn contribute to a mild hummock-hollow microtopography. Within the shrub layer, *Lindera benzoin* (spicebush) dominates, while *Pilea pumila* (clearweed) dominates the herbaceous layer, excluding nearly all other species with the exception of scattered *Osmunda cinnamomea* (cinnamon fern).

The channel substrate consists of medium sand with occasional cobbles. Soils within the level land adjacent to the channel are not poorly drained (hydric). The channel itself is more or less rectangular with a bed comprised of a mixture of sand, cobbles, and boulders. Channel width averages approximately three feet.

Upper reaches of the channel convey water out of Area 1, situated between two significant bedrock outcroppings. Water derived from Area 1 is diverted over a series of small rock waterfalls and discharges downslope. There is some indication that watercourse may be intermittent. During field surveys, standing water was observed within portions of the channel at a depth of four inches, presumably a result of recent rainfall. Within down-watercourse portions of the channel, the bed angle lessens and the channel becomes wider with an associated depositional plain that has formed into a wetland we delineated and designated as Area 3. The channel discharges or seeps into Area 3.

Area 3 (Emergent Wetland/Pond)

Area 3 consists of an emergent wetland associated with the intermittent watercourse designated as Area 2. This wetland is partly impounded by an adjacent unpaved roadway



to the north in addition to the steep surrounding topography. *Phragmites australis* (giant reed) dominate the wetland plant community. In addition to this species, *Pilea pumila* (clearweed) was observed in open spaces within the reed stand. Along the edge of the wetland, *Betula lenta* (sweet birch), *Acer rubrum* (red maple), *Hamamelis virginiana* (witch hazel), *Equisetum* sp. (horsetail), and *Aralia nudicaulis* (sarsaparilla) were observed. Along the edge of the wetland at the existing dirt

access road, *Salix bebbiana* (Bebb willow), *Osmunda cinnamomea* (cinnamon fern), *Equisetum* sp. (horsetail), and *Polytrichum commune* (moss) have pioneered along a road drainage ditch.

In general, there are patches of organic matter forming on the surface of this wet area. These soils appear to be mine tailings deposited at various times during mine grading operations. Due to their position in the landscape, that is, down-gradient of an intermittent watercourse and in an excavated depression, the soils have become obviously saturated. They can be characterized as poorly drained and redoximorphic features were observed in wetter portions of the area.

Standing water was observed within this wetland in places at a depth of approximately 1-inch. The contribution of groundwater seep is evidenced by the presence of an iron precipitate. This precipitate was observed throughout the wetland and not just in the watercourse bed. Groundwater flow is discharged from the wetland into a narrow channel, which passes over the unpaved roadway to the north and into Area 4, another watercourse channel.

Area 4 (Watercourse)

Area 4 consists of an intermittent watercourse channel that drains into resource Area 6. Plant species observed along the channel included young *Celastrus orbiculatus* (bittersweet), *Acer rubrum* (red maple), *Populus deltoides* (cottonwood), with occasional *Betula alba* (European white birch). A large *Tsuga canadensis* (hemlock) was observed within this community. *Polytrichum* (moss) mats were observed on some of the rocks within the channel.



Mean channel width is approximately three feet and the channel substrate is comprised of cobbles and boulders. Water depths averaged three inches for both pools and riffles within the channel. Water within the channel was observed to be turbid with a suspended solids load derived from the dirt roadway. These solids apparently settle out fairly quickly downstream. Discharge water was observed to be clear after approximately 75 feet.

Area 5 (Isolated Emergent Wetland)

This is a small and isolated emergent wetland that has developed within a quarry basin, or detention basin, apart from the hydrologic system (Areas 1, 1A, 2 that has been described thus far. Significant disturbance has occurred along the edges of the wetland as evidenced by the deposition of quarry tailings and a retentive berm constructed of boulders.

Dominant plant species observed within this wetland include *Juncus canadensis* (Canada rush) and *Scirpus cyperinus* (woolgrass). In addition to these species there was an admixture of *Carex lurida* (shallow sedge), *Eleocharis obtusa* (blunt spikerush), and



Typha latifolia (broad leaf cattail). Scattered shrubs included *Cephalanthus occidentalis* (button bush) and *Salix bebbiana* (bebb willow). The substrate of the pool was covered by a thin layer of a periphyton/algal mat.

Soils within the wetland were extremely shallow, situated on bedrock and are characterized as poorly drained. At the time of the field surveys, no standing water was observed in the wetland, although soils were saturated to the surface.

Silt marks on vegetation within the basin indicate that water levels fluctuate as much as 1.5 feet. Given no evidence of groundwater seep, this detention basin wetland is derived from surface hydrology.

Area 6 (Emergent Wetland)

Area 6 is associated with the intermittent watercourse (Area 4) that drains much of the surrounding area and is situated within the largest quarry pit observed on this portion of the site. This is also the largest wetland observed.

The dominant plant species within this wetland is *Phragmites australis* (giant reed), which has formed a monotypic stand. Species occurring at lower frequencies included *Populus deltoides* (cottonwood) and *Betula lenta* (sweet birch). These hardwoods growing at the very edge of the wetland. The dominant species observed includes scattered *Alnus rugosa* (speckled alder) and a vine called *Celastrus orbiculatus* (bittersweet).



Soils within Area 6 were observed saturated to the surface and have characteristics of somewhat poorly drained soils lying on bedrock at approximately 19 inches below the surface.



Groundwater input is present, as evidenced by the presence of the iron precipitate and actual observed flow from the intermittent watercourse that cascades down a 30-foot waterfall at the east end of the wetland. At this point, water discharges from the wetland and flows to an excavated channel from where the intermittent watercourse converge. This flow discharges into Area 7. Channel width reaches approximately 5 feet in width. Channel substrate was comprised of

equal mixture of sand, gravel and cobbles, and graduates to boulders on the slope situated between Area 6 and Area 7.

Area 7 (Emergent Wetland)

Area 7 consists of an intermittent watercourse channel and a small associated forested wetland. Channel width is approximately three feet and the depth of water within the channel is approximately four inches. Flow was observed to be moderate, approximately 1.0 fps. The channel substrate is comprised of a mixture of sand, cobbles, and boulders. Within the wetland, the main watercourse divides into a series of smaller "braided" channels. The watercourse passes through the wetland and terminates at the point of intersection with a dirt access road. At this point, based on field observations, flow enters a 32" (inner diameter) concrete pipe, which shunts flow beneath the road and parallel for approximately 100 feet continues as a watercourse we designate as Area 9.



Channel flow resumes for only 20 feet before it is directed into another 32 inch corrugated metal pipe. This pipe passes perpendicularly beneath the dirt road and discharges flow onto the adjacent hillside where it once again becomes channelized. Flow then passes into another 32" pipe, is directed beneath River Road, and then discharges into the Connecticut River.

Soils within this wetland were observed saturated and they have characteristics of poorly drained soils. The dominant plant species observed alongside the watercourse channel include *Alnus rugosa* (speckled alder). Within the wetland the dominant plant species

include *Salix nigra* (black willow) with scattered *Ostrya virginiana* (American hophornbeam) and *Populus deltoides* (cottonwood). Within the herbaceous layer, *Pilea pumila* (clearweed) and *Impatiens capensis* (spotted touch-me-not) dominate, with only a small patch of *Phragmites australis* (giant reed).

Area 8 (Emergent Wetland)

Area 8 is a small, isolated scrub-shrub wetland identified alongside the dirt access road within the construction laydown area. Dominant plant species observed within the wetland include *Alnus rugosa* (speckled alder), *Salix bebbiana* (bebb willow), and



Scirpus cyperinus (woolgrass). Within this plant community, the speckled alders formed a fairly dense stand of interlocking individuals. To the north of this shrub-dominated community is a monotypic stand of *Phragmites australis* (giant reed), with an admixture of *Carex lurida* (shallow sedge) and scattered *Alnus rugosa* (speckled alder).

Bedrock was observed at 12 inches in this wetland. Soils within the wetland have characteristics of poorly drained

soils. This wetland is essentially an isolated pool. It appears to receive primarily surface water and is generally in an elevated position within the landscape relative to the other wetlands identified on the site. Although there is a v-shaped ditch situated at the northern border of the wetland, there was no evidence of significant flow out of the channel; there was no evidence by scour marks or deposited material. Drainage diversions located in the surrounding area appear to have been excavated during mining operations at various times, and subsequently abandoned.

Area 9 (Emergent Wetland)

Area 9 is a very small emergent scrub-shrub wetland and is the most downgradient wetland identified on the site. It is bisected by the perennial watercourse described as Area 7 above. The wetland itself is situated in a depression between two access roads.



Bedrock was observed at 16-inches, rendering the soils as poorly drained. This wetland appears to be driven primarily by groundwater discharge. Specifically, the wetland occurs on a fairly steep

slope and soils were saturated throughout. Water depths within the watercourse channel at the time of the site visit were on the order of 2-3 inches. Watercourse width within the wetland is two feet.

Dominant plant species observed within the wetland include *Lindera benzoin* (spicebush), *Pilea pumila* (clearweed), *Alnus rugosa* (speckled alder), and *Dryopteris cristata* (crested fern).

Area 10 (Emergent Wetland)

Area 10 is a quarry with distinctive mined rock walls that was apparently utilized during the latter years of feldspar mining operations as a sediment basin. Intermittent runoff flows into this basin and ponds until or unless the pond elevation overtops fill at its northwesterly outlet disperses along an unpaved roadway. Area 10 is characterized as an isolated very small emergent/scrub-shrub wetland. This



quarry wetland area is dominated with *Phragmites australis* (giant reed) and *Typha latifolia* (broad leaf cattail), with *Alnus rugosa* (speckled alder) colonized on the northwest fringe of the basin.

ATTACHMENT B

KLEEN ENERGY SYSTEMS PROJECT

STORM WATER MANAGEMENT DESIGN

(Large format of plans sent separately)

ATTACHMENT C

KLEEN ENERGY SYSTEM PROJECT

**SEDIMENTATION AND EROSION CONTROL PLAN FOR
CONSTRUCTION
&
STORM WATER MANAGEMENT PLAN FOR OPERATION**

KLEEN ENERGY SYSTEMS PROJECT MIDDLETOWN, CONNECTICUT STORM WATER MANAGEMENT PLAN FOR OPERATION

Submitted to:

Kleen Energy Systems, LLC
90 Industrial Park Road
Middletown, CT 06457

April 15, 2005

Submitted by:

PB Power, Inc.
A Parsons Brinckerhoff Company





**Proposed Generating Facility
Kleen Energy Systems
Middletown, Connecticut**

Storm Water Management Plan

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1.0 Introduction

The Storm Water Management Plan describes the procedures for maintenance and monitoring of the storm water management systems after construction of the Kleen Energy Systems project in Middletown, Connecticut.

2.0 Description of Drainage System

2.1 Components of Proposed Site Storm Drainage System

- Catch basins
- Storm drain piping
- Culverts
- Rip-rap and gabion lined open channels
- Sedimentation areas and control structures
- Wet ponds
- Stilling basins (scour holes or energy dissipaters)
- Water quality devices (oil water separators)

2.2 River Road Storm Drainage System

The storm drainage system along River Road includes:

- Drainage ditch along south edge at bottom of cut slope
- Catch basins along either curbline of road and in drainage ditch
- Drainage culverts under River Road
- Storm drain pipes connecting catch basins along the northern side of River Road discharging towards the Connecticut River
- Culverts at intermittent streams located near the northeast and northwest corners of the site.

After the completion of the construction the maintenance and monitoring of the River Road drainage systems will be the responsibility of the City of Middletown.

3.0 Maintenance & Monitoring of Site Storm Drainage System

The following procedures shall be followed starting with the completion of construction. Major storms are those with 4.0 inches or greater rainfall within 24 hours as determined by a rain gauge in the metropolitan Hartford area.

The Owner will maintain a log of all monitoring and maintenance activities. It will include the dates each structure was inspected, cleaned, or repaired. It will also include the depth and

volume of accumulated sediment as compared to the capacity of the structure (e.g., capacity of the sump of a catch basin or sedimentation area).

The frequency for monitoring and maintenance indicated is the initial frequency to be implemented upon completion of construction. However, over time, the frequency of certain activities may be adjusted. For example, if a catch basin sump is less than 25% full during each cleaning; the time between cleanings may be doubled. If material is accumulating in a structure faster than expected, the time between cleaning should be reduced.

3.1 Catch Basins

Annual monitoring and maintenance:

- Check twice per year (spring and fall) and clean as necessary
- Prior to each cleaning, note depth of material in sump and estimate volume.
- Inspect for damage, blockage of grating, or blockage of the outlet pipe.
- Immediately remove any blockage

Prior to anticipated major storm:

- Inspect for damage, blockage of grating, or blockage of the outlet pipe.
- Immediately remove any blockage

After major storms:

- Inspect for damage, blockage of grating, or blockage of the outlet pipe.
- Immediately remove any blockage

3.2 Storm Drain Piping:

No periodic inspection is required

If blockage is detected:

- Determine location and remove

Prior to anticipated major storm:

- Inspect for visible blockage
- Immediately remove any blockage

After major storms:

- Inspect for damage or blockage
- Immediately remove any blockage

3.3 Culverts:

Quarterly inspection:

- Inspect for signs of blockage, damage or erosion.

- Remove any blockage and repair damage

Annual inspection and maintenance:

- Inspect for structural condition, signs of damage or erosion, cracking, settlement, etc.
- Remove any blockage and remove built up sediment within culvert or just upstream of inlet.

Prior to anticipated major storm:

- Inspect for damage or blockage.
- Immediately remove any blockage

After major storms:

- Inspect for damage or blockage
- Immediately remove any blockage

3.4 Open channels

Semi-annual (fall and spring) monitoring and maintenance:

- Inspect for stability of channel; note signs of erosion, sloughing slopes or other damage
- Inspect for accumulation of sediment or debris.
- Remove any accumulated sediment or debris.

Prior to anticipated major storm:

- Inspect for damage, erosion, unstable slopes or blockage
- Immediately remove any blockage; repair damage, erosion or unstable slopes.

After major storms:

- Inspect for damage, erosion, unstable slopes or blockage
- Immediately remove any blockage; repair damage, erosion or unstable slopes.

3.5 Sedimentation Area:

Annual inspection and maintenance:

- Monitor depth of accumulated sediment; record in log.
- When depth of sediment reaches 50% of the depth of the wet storage volume of the sedimentation area, remove accumulation.
- Inspect for stability of slope and signs of erosion
- Inspect outlet control structure and piping for signs of damage or blockage
- Remove any blockage and remove built-up sediment in control structure and outlet piping

Prior to anticipated major storm:

- Inspect for damage or blockage, particularly in outlet control structure and piping
- Immediately remove any blockage

After major storms:

- Inspect for damage or blockage, particularly in outlet control structure and piping
- Immediately remove any blockage

3.6 Wet Ponds:

Annual inspection and maintenance

- Annually monitor depth of accumulated sediment; record in log.
- When depth of sediment reaches 50% of the depth of the wet storage volume of the sedimentation area, remove accumulation.
- Maintain vegetation in and around basin during sediment removal.
- Inspect for stability of slope and signs of erosion
- Inspect outlet control structure and piping for signs of damage or blockage
- Remove any blockage and remove built-up sediment in control structure and outlet piping

Prior to anticipated major storm:

- Inspect for damage, erosion, unstable slopes or blockage
- Immediately remove any blockage; repair damage, erosion or unstable slopes.

After major storms:

- Inspect for damage or blockage, particularly in outlet control structure and piping
- Immediately remove any blockage

3.7 Stilling basins

Annual inspection and maintenance:

- Monitor depth of accumulated sediment and debris; record in log.
- When depth of sediment and debris reaches 50% of the depth of the stilling basin, remove accumulation.
- Inspect for stability of slope and signs of erosion

Prior to anticipated major storm:

- Inspect for damage or debris blocking the flow channel.
- Immediately remove any blockage and repair damage

After major storms:

- Inspect for damage or debris blocking the flow channel.
- Immediately remove any blockage and repair damage

3.8 Water Quality Devices (such as oil water separators)

Annual monitoring and maintenance:

- Clean twice per year (spring and fall)
- Prior to each cleaning, note depth of material in sump and estimate volume.
- Inspect for damage, blockage or grating, or blockage of the outlet pipe.
- Immediately remove any blockage

Prior to anticipated major storm:

- Inspect for damage, blockage of grating, or blockage of the outlet pipe.
- Immediately remove any blockage

After major storms:

- Inspect for damage, blockage of grating, or blockage of the outlet pipe.
- Immediately remove any blockage

3.9 Removal and Disposal of Sediment from Catch Basins and Sediment Areas

Material removed from catch basins and sediment areas shall be disposed of in accordance with the applicable Federal, state and local regulations governing the handling and disposal of such materials.

4.0 Parties Responsible for Maintenance & Monitoring of Site Storm Drainage System

Kleen Energy Systems, LLC the owner of the project will be responsible for implementing the maintenance and monitoring requirements of this procedure.

**KLEEN ENERGY SYSTEMS PROJECT
MIDDLETOWN, CONNECTICUT
SEDIMENTATION AND EROSION
CONTROL PLAN
FOR CONSTRUCTION**

Submitted to:

Kleen Energy Systems, LLC
90 Industrial Park Road
Middletown, CT 06457

April 15, 2005

Submitted by:

PB Power, Inc.
A Parsons Brinckerhoff Company





**Proposed Generating Facility
Kleen Energy Systems
Middletown, Connecticut**

**Sedimentation & Erosion Control Plan
For Construction**

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1.0 Introduction

This Plan describes the erosion and sedimentation controls to be implemented during the construction of the Kleen Energy Systems Generation Plan in Middletown, Connecticut. The plan is referred to as the E&S Plan. The Plan fulfills requirements of the Connecticut Department of Environmental Protection¹, commitments made to the City of Middletown², and conditions (1.g and 2.g) of the Connecticut Siting Council Decision and Order³.

The purpose of the E&S Plan is to minimize and control soil erosion and sedimentation. This E&S Plan is to be used in conjunction with SECP drawings showing the topography, cleared and graded areas, proposed alterations, and the locations and detailed information concerning erosion and sediment measures and facilities. The narrative describes the project, schedule of major construction activities to be performed and the application of conservation practices. The maintenance program for erosion and sediment control facilities used during construction is also provided.

1.1 Existing Site Description

The site is composed of approximately 138 acres, of which approximately 56 acres will be disturbed by the development activities. The existing site is located topographically well above the Connecticut River and south of Middletown on the south side of River Road. The site is a former feldspar quarry site that has been inactive since the early 1990's. Figure 1 superimposes the construction area over an aerial photograph of the site.

The site cover is mostly woods with some open meadow and is very steeply graded. There are two large quarries that resulted from the past mineral extraction operations that have since filled with water and become ponds. These ponds have small outlet structures that overflow when full, and have created associated intermittent stream channels that join and flow northerly through the middle of the 138 acre parcel. The predominant site grading steeply slopes towards the north with ultimate drainage to the Connecticut River. (See narrative with drainage calculations for further description of existing sub-watersheds and runoff patterns.)

The northern boundary of the site is River Road which is along the southern bank of the Connecticut River. The site near the road is very steeply graded with several areas of ledge outcrop along the entire southern property edge of River Road. River Road is terraced into the steep slope that continues northerly to the Connecticut River. In some locations, River Road was created by blasting into the rock face slope along the northern boundary of the site. About halfway down the slope between the road and the river is the right of way for the Valley Rail Line, a single-track railroad line. The railroad tracks are inactive and owned by the Providence and Worcester Railroad. The right of way is owned by the Connecticut Department of Transportation.

¹ 2002 Connecticut Guidelines for Soil Erosion and Sediment Control

² Letter from J. Sipperly (Middletown CT) to L. Golden (Pullman and Comley, RE: Middletown Inland Wetlands and Water courses Agency Orders for Kleen Energy Project, dated May 14, 2002

³ Letter from S. Derek Phelps (CT Siting Council) to W. Corvo (Kleen Energy), RE: Docket No. 225 – Kleen Energy Systems, dated November 25, 2002

The latest Middlesex County Soil Survey⁴ published in 1979 generally describes the site soils as very stony fine sandy loam with boulders and rock outcrops on mostly wooded steep slopes over shallow bedrock with narrow drainageways and a few small wet depressions⁵. Several site walkovers have been conducted to characterize existing conditions. Significant portions of the site are covered with mine tailings which are a fine powdery material.

The proposed Project development area or "footprint" is located on the most recently disturbed 30 acres on the site. This area consists of previously blasted rock or mine tailing fill areas. The surface terrain consists of obvious remnants of extensive mining; rock and soil borrow piles, excavated quarries and ledges, mine tailing piles, and a network of construction roads and drainage ditches. Some of the drainage ditches still convey runoff, some do not. All the wetlands subject to proposed fill or alteration on the KES development site have been artificially created during these mining activities. Wetland and watercourse areas identified on the site have soil/substrates consisting of bedrock, blasted stone, and mine tailings, with very little organic soil development. Evidence of original topsoil on the entire parcel is minimal. Portions of the footprint area are completely devoid of vegetation, while other areas are overgrown with secondary "opportunistic" vegetation or planted "conservation" species such as Vetch, or they are forested with saplings ranging from a few years to approximately fifteen years in age.

Additional details about existing site hydrology and wetlands can be found in the "Compensatory Wetlands Mitigation Plan"⁶ prepared by TRC Environmental Corporation.

1.2 Site Specific Erosion & Sedimentation Concerns

The unique features of this site present site-specific concerns that need to be addressed in the E&S plan. The steepness of the site slopes, particularly the drop-off just south of River Road, is a major concern with respect to potential damage caused by runoff to River Road and/or the down gradient railroad line. There have been past problems with the stability of River Road (partially cut into the rock slope) and the deposition of debris from the steep rock and earth slopes into the ditches along the south side of River Road. The E&S plan must emphasize the importance of constructing stable slopes and drainage channels so that material is not washed downstream.

⁴ Soil Survey of Middlesex County, Connecticut; US Department of Agriculture, Soils Conservation Service, February 1979.

⁵ The Soils Survey classifies the site soils as Charlton-Hollis, Hollis-Charlton and Hollis Rock Outcrop. Each group is similar to the description given.

⁶ Compensatory Wetland Mitigation Plan, Kleen Energy Systems, Electric Generating Facility, Programmatic General Permit Program Category II Addendum Application, prepared by TRC Environmental Corp., July 2003 (Rev. Sept. 2003).

2.0 Project Purpose

2.1 Description of Project

The Kleen Energy Systems Project is an electrical generation facility to be constructed on the 180 acre site off of River Road in Middletown Connecticut. The power plant will have a nominal rating of 520 MW. The power generation equipment is comprised of a 2 X 2 combined cycle gas turbine configuration. The combined cycle configuration consists of two gas turbines. Each gas turbine powers an electrical generator. The gas turbines are connected to two Heat Recovery Steam Generators which take the waste heat from the gas turbine and generate steam. Each Heat Recovery Steam Generator provides steam to a steam turbine which is also connected to an electrical generator. The project is rated at a nominal 520 MW with the capacity to duct fire the Heat Recovery Steam Generators up to 620 MW.

The major features of the project consist of the power plant, electrical switchyard, access roads, and supporting utilities. The power plant is located on the southeastern portion of the site at approximately elevation 340'. The power generation equipment is primarily located in a 60,000 square foot three story building which encloses the gas turbines, steam turbine, support equipment, control room, and administrative offices. Located outside the power plant are the Heat Recovery Steam Generators, exhaust stacks, cooling towers, water treatment building, transformers, and warehouse.

Immediately north of the power plant at approximately elevation 340' is the electrical substation which connects the plant to the electrical distribution system in Connecticut.

The plant is located on the site of a former feldspar mine in Middletown Connecticut on River Road. The site presents many benefits and several challenges. The benefits of the site is that it is zoned for industrial use, which allows the siting of power generation facilities, has direct access to 345 kV transmission lines, close proximity to a high pressure natural gas line, and access to sufficient quantities of water. The challenge of the site is the steep topography and disturbed nature of the site as left by the mining operation. The site ranges in elevation from 100 feet above mean sea level to over 500 feet. Creating an area of sufficient size for the power plant, switchyard, and construction laydown areas and the construction of roads to access the plant and the switchyard requires the excavation of a significant amount of material, much of it rock. The plant requires connections to the natural gas distribution system, sewer system, and upgrades to the storm water management system.

The former mining operation at the site left the site in a condition that has caused significant erosion of the mine tailings and sedimentation problems that affect local roads and the Connecticut River. These problems will be addressed by this project in cooperation with the City of Middletown Public Works Department and Wetlands Commission.

Several types of drainage systems will be used to control storm water due to the nature of the project and the topography of the site. A brief overview of each system is presented below. Details of the drainage systems can be found on the Storm Water Management Drawings⁷.

Plant Power Block

The proposed drainage system for the Plant Power Block area is made up of three components. Curbing of the extension of the plant roadway will direct flows to a closed drainage system that will be equipped with hooded catch basins and sump areas where required. Oil/water separators will be installed prior to discharge to Sedimentation Areas. Sedimentation Areas (SA) will be installed to capture sediment during construction as well as during the operational phase. These areas have been sized to capture the required amount of sediment and also allow for the peak flows to be conveyed downstream.

Roadways

The storm water system for the access roadway will consist of a closed drainage system equipped with catch basins with hoods and sump areas where required. Where possible, the closed drainage system will discharge onto slopes for overland flow. The roadside channels will convey and discharge storm water to Sedimentation Areas.

Steep Terrain

Intermediate benches with interceptor channels will be installed across steep slopes to minimize erosion and, where possible to divert flows into Sedimentation Areas. Storm water flows will be diverted upstream of work areas to separate overland and construction runoff. Appropriate vegetation or a cover of crushed stone will be established on disturbed areas that are not impervious.

River Road

Storm water will be conveyed under River Road via a series of culverts. Stilling basins will be used upstream of River Road to control velocities and prevent scour. Drainage from River Road will be collected in catch basins which will discharge along the slope on the north side of the road. Drainage will be directed through the existing culverts under the railroad tracks.

2.2 Construction Disturbance

In order to propose appropriate site-specific erosion and sedimentation controls, it is important to consider the areas of the site to be disturbed, the nature of those construction activities, and the proximity of the areas to be disturbed to downstream features such as River Road, the rail line, and the Connecticut River. It is necessary to develop a series of plateaus or terraces at different elevations on the site to fit the proposed development because of the steep slopes and shallow bedrock. This will involve considerable earthwork operations and construction phasing to accommodate the movement of soil and the blasting and removal of rock and large boulders.

In addition, a new road will be constructed from River Road to reach the various site platform areas. The road will intersect the existing River Road near the northwest corner of the site and will pass through the site in a generally southwesterly direction.

⁷ Kleen Energy Systems Preliminary Storm Water Design January 12, 2004

2.2.1 Areas to Be Disturbed

The areas that will be disturbed are generally in the center and the eastern portion of the site as shown on Figure 1. These include:

- Power Block and Electrical Substation
- Roadways
- Utility corridors
- Upper and lower laydown and parking areas
- River Road Drainage improvements

2.2.2 Areas to Be Maintained As Undisturbed

Figure 1 also shows the portions of the site that will not be disturbed by the project. The undisturbed parts of the site are located in two general areas:

- Band of undisturbed areas south of River Road
- Portion of the site south and west of the proposed development (called Reserve Area)

The implications are as follows:

- There will be a band of undisturbed area along the top of the slope just above River Road. This will create a buffer between the earthwork areas and the rock and earth slope next to the road. Proper sedimentation control upstream of this buffer zone will be constructed to avoid soil and rocks from being washed down to River Road.
- The two ponds that have formed within the quarries are upstream of the proposed site construction area and will not be affected by construction.
- The small existing pocket wetland near the upper laydown area will also be outside the construction area and will be protected from impact due to construction.
- The portion of the site along the western border closest to the residential will not be disturbed.

3.0 E&S Plan Methodology

3.1 Criteria and Objectives

The objectives of the site erosion and sedimentation control plan include the following:

- Protect River Road and the rail line from damage that would result from soil and rock washing downstream from the plant area.
- Maintain stable intermittent stream channels through construction zone.
- Prevent sedimentation of wetlands, streams, adjacent property, River Road culverts and storm drains, the rail line culverts, and the Connecticut River.
- Maintain stability of new cut and fill slopes throughout the construction period.

3.2 Engineering and Design Support

The calculations supporting the hydraulic design for the site are contained in the support documents Kleen Energy Systems Project Middletown, Connecticut Storm Water Management Preliminary Design Calculations, Volumes I through V. These volumes are subdivided into the following sections:

| Volume No. | Calculation Title | Description and Purpose of Calculation |
|------------|--|--|
| I | Site Hydrology Computations – Existing Conditions | The purpose of this section is to determine the volume of runoff during various storm events for the pre development existing conditions. |
| II | Site Hydrology Computations – Post Development Watershed No. 1 | The purpose of this section is to determine the volume of runoff during various storm events to each structure during the "Built Condition". |
| III | Site Hydrology Computations – Post Development Watershed Nos. 2 and 3 | The purpose of this section is to determine the volume of runoff during various storm events to each structure during the "Built Condition". |
| IV | Site Hydrology Computations – Post Development Watershed No. 4 and River Road Hydraulic Structures | The purpose of this section is to determine the volume of runoff during various storm events to each structure during the "Built Condition". |
| V | Computations | This section provides the calculations that support the basis for sedimentation pond, wet pond, and channel design. |

3.3 Site-Specific Controls

Following are issues and erosion and sedimentation control guidelines to be implemented continuously throughout the construction period:

General:

1. All erosion and sediment control measures will be constructed in accordance with the 2002 Connecticut Guidelines⁸.

Pre-Construction:

2. Develop detailed construction phasing plans and sedimentation control details.
3. Develop planting plans for disturbed areas.
4. Flag the limits of construction (toes of slopes, limits of clearing, roadway baseline).
5. Hold preconstruction meeting with DEP and City of Middletown departments.

Construction -- General:

6. Construction access will only be permitted from River Road, so as not to disturb the areas uphill of the proposed site development.
7. Construction access will not be permitted using the portions of the site that are indicated as the reserve area.
8. Silt fence shall be installed along the toe of all cut and fill slopes, around soil stockpile areas, and in those areas shown on the plan and inspected and maintained frequently to ensure their appropriate placement and effectiveness.

Prior to the start of earthwork:

9. Install anti-tracking pads at each construction entrance point from city streets.
10. Prior to beginning earthwork operations in any area of the site, install sedimentation fencing and hay bales at the toes of the proposed slopes.
11. Silt fence not installed parallel to the slope shall have five foot long wings installed every 100 feet to intercept and diffuse flows along the silt fence.
12. Where steep fill slopes drain towards River Road, use sedimentation barriers with adequate structural strength for sedimentation fencing.
13. Monitor the catch basins, ditches, drain pipes and culverts along River Road adjacent to the site and clean when required.

Clearing & Earthwork Operations:

14. In general, the extent of land disturbance outside the construction area will be kept to a minimum; reestablishment will be scheduled as soon as practical. In particular, all new cut and fill slopes will be seeded, covered with crushed stone, or otherwise stabilized as soon practical. See requirements in Section 3.5 below.

⁸ 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, by The Connecticut Council on Soil and Water Conservation in Cooperation with the Connecticut Department of Environmental Protection (DEP), DEP Bulletin 34.

15. Cut trees within the defined clearing limits and remove cut wood.
16. As the first step in earthwork operations in any area of the site, install the sedimentation areas (basins) with temporary risers covered with filtration fabric. Special filtration materials may be required to capture the fines resulting from the mining operation.
17. Strip and stockpile topsoil for reuse on slopes and other lawn and planted areas.
18. Slope stabilization: Immediately after a fill or cut slope is complete, it shall be stabilized per the requirements in Section 3.5.
19. Where the toe of a cut slope meeting existing grade forms a drainage swale, the toe of slope shall be lined with riprap.
20. Where site disturbance will cut across the path of an existing intermittent stream, a new stabilized channel shall be constructed for the watercourse as the second order of work (immediately after installation of sedimentation control measures). A stabilized channel shall either be stone or rip rap lined, a pipe culvert, or other stabilization material as indicated on the plans. When the stabilized channel or culvert is installed, also install appropriate sedimentation control devices to prevent material from reaching the new channel or culvert.
21. New drainage channels shall be lined immediately after they are formed.
22. Construction staging areas subject to heavy travel shall have a crushed stone working surface.
23. Stockpiles of earth or rock materials shall be located so as not to interrupt the pattern of drainage.
24. Stockpiles shall be enclosed by free-standing siltation fencing. If stockpiled soils are not needed for more than 60 days, the stockpile shall be seeded and mulched.
25. Additional control measures will be installed during the construction period if necessary or required, as determined the local wetlands authority.
26. A minimum of 1,000 feet of silt fence shall be stored at the site for emergency use.
27. Water and or calcium chloride shall be applied to unpaved areas as necessary to prevent wind generated sediments and dust.
28. Install binder course pavement for roadway as soon possible.
29. After roadways are paved but prior to the stabilization of all slopes and other areas of exposed soil, employ street sweeping of the paved site roadways on a periodic basis.

Dewatering and Debris Removal:

30. Any excavations that must be dewatered will be pumped into a temporary sediment basin prior to discharge into an existing water course or new storm drain or channel. Water from dewatering activities shall not be discharged into any wetland, nor shall it be discharged into the quarry ponds. The discharge point for dewatering shall be designated in the E&S Plans.
31. Debris and other wastes resulting from equipment maintenance and construction activities will not be discarded on-site.
32. Sediment removed from erosion control structures and permanent facilities will be disposed of in a manner consistent with the intent of the plan.

33. Turf or landscape areas shall be mulched or otherwise temporarily stabilized if seasonal or other restrictions preclude permanent planting. Refer to planting notes in section 3.5.

At Completion of Construction:

34. All temporary E&S control measures shall be properly maintained until stabilization has been achieved. Stabilization means that disturbed soil surfaces have a dense stand of vegetation or are covered by properly installed erosion control blanket, rip rap, mulch, pavement or other erosion-resistant surface.
35. The Contractor and the City of Middletown land-use officials shall determine whether the site is stabilized in accordance with the above and the Connecticut guidelines for erosion and sediment control.

3.4 Monitoring and Maintenance of E&S controls

Monitoring and maintenance of the erosion and sediment control devices shall occur weekly as well as after and before storm events as noted below. These procedures are to be implemented continuously during the entire duration of construction. Monitoring and inspection shall be by the Contractor. The contractor shall take immediate action to correct any defects or mitigate any environmental concerns.

1. The Contractor shall inspect all erosion and sediment controls weekly, before an anticipated storm greater than 0.5 inches, and following a significant storm event (0.5 inches or greater). This inspection shall include the River Road storm drain system (catch basins, pipes, ditches, and culverts). A monthly field report shall be prepared identifying the progress of site development, effectiveness of the E&S measures, and remedial actions or field changes to the plan.
2. Silt fences shall have sediment removed before depth of sediment is half the height of fence.
3. Ensure that filter fabric on silt fences is capturing the fines from the mining operation.
4. Ripped fence or broken posts are to be repaired as soon as practical.
5. Sediment basins shall be cleaned before sediment depth is half of basin depth.
6. Catch basin inverts shall be cleaned or replaced when clogged or full. Catch basin sumps shall be inspected at least twice annually and cleaned when necessary.
7. The River Road storm drain system (catch basins, storm drain lines and culverts) shall be periodically checked and cleaned as required during construction. This system shall also be cleaned upon completion of construction.
8. Construction entrances (anti-tracking pads) and gravel check dams shall be replaced when void spaces are full or structures are breached, as applicable.
9. Temporary erosion control measures shall not be removed until the permanent structures are in place, construction in the area is complete, and all soil surfaces are permanently stabilized. After removal of erosion controls, stabilize the vicinity.
10. Structural components (catch basins, culverts, channels, scour holes, biofiltration areas, etc.) shall be cleaned of all sediment upon completion of construction.

- Compensatory Wetland Mitigation Plan, Kleen Energy Systems, Electric Generating Facility, Programmatic General Permit Program Category II Addendum Application, prepared by TRC Environmental Corp., April 2005

6.0 Site Drawings

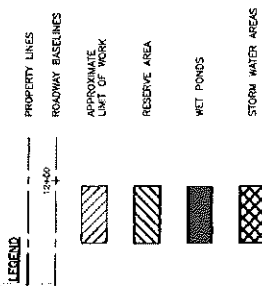
The Preliminary Storm Water Management Plans (Volume I) and the Sedimentation and Erosion Control Plans (Volume II) provide the construction details for the project generally including:

- Existing Site Plan (topography, natural features, boundaries, roadways, etc.)
- Drainage and Watershed Areas
- Clearing, Grading, and vegetation stabilization plans
- Construction phasing plans
- Sedimentation and Erosion Control Drawings
- Sedimentation and erosion control details

Standardized design plans and construction specifications have been developed for each E&S control measure to be employed to control erosion and sedimentation. The standardized design plans for E&S measures have been included along with the Sedimentation and Erosion Control Plans in Volume II of the drawings.

7.0 Responsible Parties

The construction contractor O&G Industries, 112 Wall Street Torrington Connecticut, will be responsible for the construction, maintenance, and monitoring requirements of this procedure.



1. PHOTOGRAPH WAS CREATED BY MATCHING TOGETHER AERIAL PHOTOGRAPHS TAKEN IN THE FALL OF 1986.
2. PROPERTY LINES AND ROADWAY BASELINES ARE APPROXIMATE AND ARE SHOWN FOR ORIENTATION PURPOSES.

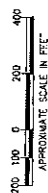
[illegible]

FIGURE 1